THE GAS JOURNAL

JUNE 6, 1934

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A Glance at the Contents—

Technical Signpost to the "Journal."

Published to-day is our "Technical Signpost" to Vol. 205 of the "JOURNAL," covering items of outstanding technical interest during the January-March quarter of the present year. [p. 650.]

Abolishment of Chief Gas Examiner and Referees.

In a letter reproduced from *The Times* Dr. Charles Carpenter criticizes the Board of Trade's proposal in the Gas Undertakings Bill to dispense with the services of the present Gas Referees and Chief Gas Examiner. [p. 647.]

South African Lighting Association.

Speaking at the Annual Meeting of the South African Lighting Association on May 30, the Chairman (Mr. William Cash) said there were distinct indications that the trade position was improving. A dividend of 3% was declared. [p. 660.]

Gas Boilers for Public Baths.

In a paper before the 1934 Conference of the National Association of Bath Superintendents, Mr. J. T. Grundy recorded some experiences in connection with the installation and subsequent working of gas boilers at the Central Baths at Burnley. [p. 657.]

City and Guilds Examination Questions.

The questions set in the City and Guilds of London Institute Examinations for 1934 in various gas subjects are given. [p. 653.]

Gasholder Repair While in Action.

Over 200 gasholders, up to a capacity of 3,500,000 c.ft., have been repaired by an electric welding process employed by a Berlin firm and described by Mr. Basil Heastie. [p. 655.]

Gas Poisoning Fatality.

At the conclusion of the trial of an action in the Scottish Courts by Mrs. Lily Mitchell against Robert Addie & Sons' Collieries, Ltd., Coatbridge, in respect of her husband's death from gas poisoning, the jury awarded the pursuer £800 damages. [p. 656.]

Imperial Continental Gas Association.

The One Hundred and Eighty-Sixth Ordinary General Meeting of the Imperial Continental Gas Association was held in the Great Eastern Hotel, Bishopsgate, London, E.C., on June 1, Sir Thomas Royden, Bt., C.H. (Chairman of the Association), presiding. [p. 658.]

Forthcoming Engagements

June 9.—SCOTTISH EASTERN JUNIOR ASSOCIATION.—Summer Visit to Stirling.

June 13.—MANCHESTER AND DISTRICT JUNIOR ASSOCIATION.—Visit to Messrs. General Gas Appliances, Guide Bridge, Manchester.

June 14.—S.B.G.I.—Council Meeting, 11.15 a.m.

June 16.—LONDON AND SOUTHERN JUNIOR ASSOCIATION.—Summer Visit to Hastings.

June 20.—B.C.G.A.—Meeting of Executive Committee, 12 noon.

June 21.—SOUTHERN ASSOCIATION (WESTERN DISTRICT).—Commercial Meeting at Rougemont Hotel, Exeter, 2.30 p.m.

June 29.—WAVERLEY ASSOCIATION OF GAS MANAGERS.—Annual Meeting in Edinburgh.

July 7.—WESTERN JUNIOR ASSOCIATION.—Summer Meeting.

Sept. 6.—NORTH BRITISH ASSOCIATION OF GAS MANAGERS.—Annual Meeting in Inverness.

Sept. 24-26.—B.C.G.A.—Annual General Meeting and Conference at Sheffield.

Nov. 6 and 7.—I.G.E.—Autumn Research Meeting.

1934 "JOURNAL" Directory.

Page 14. BURNLEY. J. H. Clegg, E. & M., resigned.
Page 62. SOUTHPORT. J. H. Clegg appointed E. & M. vice J. Bond, retired.
Page 88. MOFFAT. J. Johnstone, S., deceased.

EDITORIAL NOTES

New Uses for Gas

IN his Presidential Address to the Institution of Gas Engineers yesterday Mr. Tarratt emphasized the need for adopting fresh methods to extend existing and develop new uses for gas. As we have said on several occasions, we must cultivate a more imaginative outlook on the gas business. As it is, the Gas Industry is a big public utility; it is small, however, when one considers its potentialities. This fact should be constantly in the minds of all gas executives. Who would have thought a year or two ago that gas would be used extensively for the floodlighting of open-air swimming pools? Notable examples of this application of gas have been described and illustrated in our pages, and there can be little doubt that during this season the use of gas for this purpose will increase. Wherever there is an open-air swimming pool the Gas Industry, so to speak, should be in it.

Nor is lighting the only or even the main possibility in this direction. A fortnight ago we mentioned in the "JOURNAL" that gas is now being used to heat the water at the new Gosford swimming pool at Coventry. The installation, which is giving every satisfaction, should provide a lead to many another undertaking; and we hope that the Development Centres are getting busy on the job. Thermostatic control is so simple with gas that one wonders why on earth it was not developed until comparatively recently. At the Gosford pool comfort is the keynote—thanks to gas. On leaving the warmed water (and the thermostatic control is brought into operation by a rise or fall in temperature of 1° F.) bathers enter dressing rooms heated by gas and maintained at a suitable temperature by similar control. Health of the open air combined with the comfort of warm water. Coventry is not the only place where gas is being employed successfully for heating the water in open-air swimming pools. Worcester provides another example of a first-rate installation. There ought to be many more. In any case every Development Centre in the country should have full information of how the load is to be obtained and exactly why failure has been registered—if, indeed, there has been failure in competition with other fuels. Undertakings which sit tight when business such as this is obviously at their doors cannot pride themselves on the quality of their salesmanship.

Now let us go indoors—into the public baths at Burnley, to see how enterprise and a spot of confidence have rewarded the Burnley Gas Department. These baths are "all gas." Plunge baths, slipper baths, and showers—all the water heated by gas, and at all times of the day and night to a suitable and known temperature. No trouble due to faulty stoking, no dirt—an important consideration where bathing is concerned—no wastage of space, no fear of failure. And the system has proved to combine economy with all these and other advantages. Have all the Development Centres the necessary data to enable subscribing undertakings to offer convincing arguments why it would pay municipalities to use gas? Is the Gas Industry as a whole in close touch with bath superintendents and with their official organizations? Or don't we want the load? "Those also serve who only stand and wait." If this applies to the Gas Industry, however, it will quickly find itself standing behind the counter of competitive interests.

The installation at the Central Baths, Burnley, is described in the "JOURNAL" to-day by Mr. J. T. Grundy, Superintendent of the Baths Department. At the outset the author explains that his contribution has not been prepared with a view to advocating the installation of gas-fired boilers, but rather as a record of the experiences at Burnley. We feel sure, however, that these experiences are likely to make those in charge of bathing establishments anxious to study the possibilities of gas in their own areas. Mr. Grundy gives a wealth of useful data, and is obviously pleased with the operation of the plant. The gas consumption for a year's working was 8,659,000 c.ft., and the cost £451. Prior to the alterations, the coal bill came to about £400, but with gas Mr. Grundy has saved £48 on labour charges, £4 10s. on the removal of ashes, and £3 for the cleaning of flues. "The buildings and cellars are now much cleaner and the attendants can be suitably attired at all times for their duties of attending on bathers. A long-standing complaint of black smoke from the baths chimney has been overcome, and a lead has been given to other users of steam boilers in smoke abatement." The Burnley Gas Department has also provided a lead which other gas undertakings should be anxious to follow.

Degree-Days

THROUGH the courtesy of the Institution of Heating and Ventilating Engineers we were able last week to publish a most interesting article by Mr. A. F. Dufton, of the Building Research Station, Watford, on the subject of "degree-days," accompanied by a helpful map of Great Britain contoured in terms of degree-days. This map, which is based on the "Book of Normals," gives an accurate idea of how fuel consumption varies with locality. American gas engineers have taken a great deal of interest in the question and have found the degree-day a very useful unit of reference. The term degree-day originated in the Gas Industry, and was standardized by the American Gas Association as a unit which is the difference between 65° F. and the daily mean temperature when the latter is below 65° F. As Mr. Dufton points out, the base of 65° F. was chosen because it was demonstrated that 65° F. is the maximum temperature at which fuel is burned to supply heat to a residence and because the fuel consumed varied almost directly with the difference between 65° F. and the outside temperature. In Great Britain, where an inside temperature of 65° F. is generally preferred to one of 70° F., it would seem desirable to adopt a temperature of 60° F. as the base for the British degree-day.

We think the Gas Industry of this country would find it advantageous to consider the degree-day closely, for it would be most useful in estimating for heat requirements and also in comparing the results of different undertakings. For example, the map given in last week's "JOURNAL" shows a variation in different parts of the country from 3,000 to 6,500 degree-days. Altitude, of course, has its effect—an increase of, roughly, one degree-day per foot. Attention to the thermometer is part of every gas distribution man's work. The demand for gas is very sensitive to the weather. In one particular undertaking it has been found after many years' experience that one degree rise or fall in temperature causes approximately 1% decrease or increase in the amount of gas sold.

Beating the Thermometer

THE Brighton, Hove, and Worthing Gas Company is endeavouring to rise superior to temperature, however. In past years, we learn from the May issue of the Company's Co-Partnership Magazine, it has been reckoned that, comparing weekly averages of corresponding yearly periods, a difference of 1° up or down in mean temperature resulted in a decrease or increase of a million cubic feet in output. The following figures for the four weeks ended April 30 last evidence the great influence of temperature drop. With a 2° F. decrease in mean

temperature during the first week, there was an increase in output of 7½ million c.ft. The next week, with a 4½° F. drop in temperature, the output was greater by 8½ millions. The mean temperature jumped up by 6½° F. the following week; gas sales dropped by 2 millions. During the fourth week, with a decrease in mean temperature of 1½° F., there was an increase of 2 millions. So far, the effect of temperature was as one would anticipate. During the fifth week ended May 7, however, an *increase* in temperature of 1° F. was accompanied by an *increase* of 1 million c.ft. in gas output.

It is, of course, difficult to arrive at any firm conclusion on the basis of a single result such as this, but as a single result it is noteworthy; and we hope that the Brighton Company will continue to increase gas sales with increase in temperature. Also, we hope that the Company will continue this comparative record, which is bound to be helpful not only to the Company, but further afield. Such a record is an admirable index to the results of salesmanship, when all the particular factors are taken into account. Towns on the coast, with their seasonal influx of visitors, cannot fairly be contrasted with inland towns where the load is steady, though Brighton is perhaps more comparable than any other seaside resort. In any case, however, the fact remains that the Brighton Company has beaten the thermometer. It has increased its sales over the corresponding week of 1933, in spite of an increase in temperature.

This idea of beating the thermometer is an excellent one, and it should provide sales incentive. Every gas water heater installed will help to achieve the aim, and we feel sure that attractive summer rates for water heating by gas would handsomely benefit those undertakings with sufficient initiative and faith in their product to put such rates into operation.

An Art in Industry Exhibition

THE artistic touch in the production of industrial wares exercises a far wider appeal than is often realized, and the Gas Industry has in recent years made wonderful progress in the direction of making available for its consumers a wide range of appliances well calculated to enhance the beauty of the home. Considerable interest will therefore be attached to a forthcoming Exhibition of British Art in Industry, which is to be held by the Royal Academy of Arts, in collaboration with the Royal Society of Arts, at Burlington House during the first quarter of next year. Here surely is an outstanding opportunity for the Industry to demonstrate the artistry it can put into the field of domestic equipment, and although it is several months before the Exhibition opens, it is not too early to begin the planning of a really representative display.

There should be every encouragement to the Gas Industry in the appearance on the appropriate Advisory Committee—that concerned with domestic equipment—of the names of Sir Francis Goodenough, C.B.E., and Mr. W. D. Rowe, of the British Commercial Gas Association, while intending exhibitors may obtain particulars relative to gas equipment upon application (in writing only) to Mr. W. H. Becket, at 28, Grosvenor Gardens, S.W. 1. It is also of interest to know that Sir Francis Goodenough is serving on both the General and Central Advisory Committees. The domestic equipment section, in which the Gas Industry will be mainly interested, will include gas, electric, coal (and, we trust, coke, though there is no mention of it) fires, lighting and other fittings, and domestic appliances generally.

The aim of the Exhibition is threefold. First, to impress upon the British as well as the foreign public both the importance of beauty in the articles they purchase, and the fact that British manufacturers, in co-operation with British artists, are capable of supplying such articles in all branches of industry. Secondly, to enable British manufacturers to study the full extent to which British artists are capable of supplying original, attractive, and technically suitable designs for the production of articles by mechanical means, and to turn the attention of British artists to design in relation to industry. And, thirdly, to show that a more frequent association of the artist's name with the article produced from his design can be of great advantage in promoting demand. As an indication of the classes of articles to be included in the Exhibition, the following may be cited from the range and selection quoted: Domestic equipment, furniture and interior decoration, plastic mouldings, ceramics, glassware, and many more.

Art in industry is a subject which has created an appreciable amount of interest in recent years, and a glance at the apparatus displayed in the showrooms of any up-to-date gas undertaking will prove that the Industry has not been slow to follow—and in some instances lead—the trend set up by this interest. The Gas Industry's progress in the field of art in industry has been principally, of course, in the design and finish of its domestic equipment, though there are not found lacking in the Industry one or two striking examples in the direction of attractive layout of works and a greater æstheticism in regard to larger plant. For while the public's demand for more beauty in the home must be, and is being, met, it is also being slowly but surely brought home to administrators of industrial concerns that brighter surroundings for the operatives makes for pleasanter working conditions with their natural outcome of more efficient work. We therefore look forward to seeing a comprehensive display on behalf of the Gas Industry at the Art in Industry Exhibition in 1935.

Liability for Service Escapes

A CASE of interest to Scottish undertakings, which is referred to in our Legal columns, came before the Court of Sessions, Edinburgh, on May 25. The case arose from a claim by Mrs. Lily Mitchell or Miller against Messrs. Robert Addie & Sons, Collieries Limited, under the following circumstances. Mrs. Miller, her husband, and daughter resided at a house at Coatbridge belonging to the Colliery Company which was supplied with gas through a service pipe, the property of the Colliery Company, who were responsible for the upkeep, maintenance, and renewal of the pipe. During the night of Dec. 10, 1932, Mrs. Miller, her husband, and daughter were seriously injured by coal gas poisoning, with the result that Mrs. Miller's husband subsequently died, and that her own health and that of her daughter was affected. It was admitted that the escape of gas was due to the corrosion and decay of the service pipe, which was of malleable iron and had been laid for some 30 years in a soil of clay mixed with ashes and lime and other debris available as a result of the building of houses. The case originally came before the Sheriff Court of Lanarkshire, and the Sheriff Substitute, in allowing the parties a proof of their respective averments, held that Mrs. Miller would be entitled to damages if she could prove that gas escaped from the service pipe whether the Colliery Company were negligent or not. An appeal from this finding to the Second Division was heard on Dec. 22.

The main point of the appeal was whether the Colliery Company would be liable in spite of the fact that no act of negligence or negligent omission could be found against them. In legal language, could they be held liable on the ground of nuisance? The leading case on the doctrine of nuisance is *Rylands v. Fletcher*, which was decided in 1868. In this case it was held that if a person brings or accumulates on his land anything which, if it should escape, might cause damage, he does so at his peril. If it does escape and causes damage, he is responsible, however careful he may have been and whatever precautions he may have taken to prevent the damage. In England this decision has been freely and widely applied, and it has been held to render gas undertakings liable for an escape of gas altogether apart from the question of negligence. Thus, in *Goodbody v. Poplar Borough Council* (1925), 85 L.J., K.B., 142, Lord Darling said " if they—*i.e.*, the gas undertaking—have brought gas there and failed to keep it innocuous, then I think the case comes within the principle of *Rylands v. Fletcher*." In another English case the Judge stated

"that the gas did escape from the mains, and I have no hesitation in saying that there was a nuisance." The Scottish Courts, however, have always been more reluctant to impute liability on the ground of nuisance, placing great weight upon an opinion expressed by Lord Cairns in the *Rylands v. Fletcher* case that liability in respect of nuisance only arose when there was an unnatural, as distinguished from a natural, use of land.

In the present case the Second Division were of the opinion that use of land for the laying of gas service pipes was, having regard to modern conditions of life, a natural use of the land, and that the Colliery Company could not in law be held liable on the ground of nuisance. In order to succeed, therefore, it would be necessary for Mrs. Miller to prove that the Colliery Company had been negligent, and their Lordships allowed proof on that issue. It should be emphasized that this decision, although consistent with the Law of Scotland, would probably not be followed in England, where, as has been indicated, gas undertakings have been held to be liable upon the sole ground of nuisance. In view of the judgment of the Second Division, the case came before the Court of Sessions in May of this year for the purpose of deciding whether Mrs. Miller could produce proof that the Colliery Company had been negligent. The main question at issue was whether the Colliery Company, having regard to all the circumstances, should have maintained some system whereby the service pipes were periodically inspected. The two principal cases on this point are *Mose v. the Hastings and St. Leonards Gas Company*, 1865, 4 F. & F., 324, and *Price v. the South Metropolitan Gas Company*, 1895, 65 L.J., Q.B., 126. In both these cases it was held that the Gas Companies were liable to keep such reasonable inspection of their mains as would enable them to detect where there was an escape of gas. The cases give no support to the contention that gas undertakings must be constantly digging up their pipes in order to look at them, but merely affirm that where there is some fact such as smell or other circumstance which would indicate that there might be an escape, the gas undertaking, on being notified, must use due diligence to inspect.

It was in accordance with these principles that the Judge charged the jury in the case under consideration. In his charge, he said that unless the jury were satisfied that complaints were made to the Colliery Company there could be no fault on the part of the Colliery Company in regard to this matter. He said that it would be placing an impossibly hard burden upon the Colliery Company or upon any Gas Company to say that they had to inspect unless there was something in the way of warning addressed to them, or unless they knew that the character of the soil was especially bad. Unless the peculiar nature of the soil made it reasonable so to do, no Gas Company could be expected to go round pulling up the gas pipes to see whether there were or were not possibilities for gas to escape.

The jury found that the Colliery Company were liable and awarded Mrs. Miller a total of £600 for herself and £200 for her daughter. This decision is based entirely upon the findings of the jury on both or either of two questions of fact, firstly, whether the Colliery Company had received notice of warning of the danger, and, secondly, whether the soil in which the pipes were laid rendered those pipes particularly subject to corrosion.

To summarize this case, therefore, it appears that in so far as it was held that the Colliery Company could not be liable on the ground of nuisance, it is based upon a conception of the Law peculiar to Scotland; and further that the finding of negligence against the Colliery Company is based solely upon questions of fact, and does not affect the principles established by former cases.

PERSONAL

TRIBUTES TO MR. JOHN BOND, O.B.E.

Mr. John Bond, O.B.E., who on June 4 retired from the position of Engineer and Manager of Southport Corporation Gas Undertaking, and is to be succeeded by Mr. J. H. Clegg, of Burnley, was on Thursday presented with an illuminated address by Mr. E. P. Wilson (Chairman) on behalf of the Southport Gas Department Employees' Social Club, of which Mr. Bond has been President and one of the founders. At the same gathering Mr. Joseph Thompson, one of the oldest employees, presented the retiring Engineer with a camera, complete with inscribed leather case, from the staff and workmen of the Department.

Tributes were paid to Mr. Bond's work during his term of office and to the interest he had always shown in the people working under him. Reference was also made to the improvements at the works during the thirty years Mr. Bond had been there. Letters of appreciation were read from Mr. T. R. Cook, the Engineer and Manager at Blackpool, and from Mr. James Blundell, who holds a similar position at Carlisle, both of whom mentioned that they had much to thank Mr. Bond for in helping them to the positions they now held. Both had served under Mr. Bond at Southport.

* * *

We join with his fellow members of the Institution of Gas Engineers in congratulating Lieut.-Col. and Brevet-Col. WILLIAM MONCRIEFF CARR, T.D., Territorial Army Reserve of Officers, Honorary Colonel, 55th West Lancashire Divisional Engineers, Royal Engineers, Territorial Army. In the King's Birthday Honours List issued on Monday, Col. Carr is mentioned as having been awarded the O.B.E. (Military Division).

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Mr. A. C. SLAUGHTER has relinquished his position with the *Gas World* after thirteen and a half years' service, during more than six of which he has been Editor.

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The Bolton Gas Committee have appointed Mr. A. HASLAM, of Northampton, as their new Mains Superintendent. Mr. Haslam is a Bolton man, having been trained at the Bolton Gas Department. He has been at Northampton for six years.

* * *

Sir FRANCIS GOODENOUGH has left London for Eastbourne, where he will spend such a time as is necessary for completing his recovery from the serious illness which has incapacitated him for the last six weeks.

OBITUARY

The death has occurred at Tweedmouth of Mr. ROBERT R. RIDDELL, Chairman of Berwick and Tweedmouth Gaslight Company.

Correspondence

Who Sells the Cheapest Gas?

SIR,—I have read in the "JOURNAL" for May 30 the letter from the Engineer and Manager of the Middlesbrough Corporation Gas Department on the subject of gas prices. I am afraid Mr. Blincoe is under a misapprehension, and is comparing the *basic* price with the *selling* price. The two are quite distinct. I give below the actual questions put to me by Counsel and my replies, which I think explain all.

> 893.—Now I want to come to the next point: your system of charge and dividend regulation. You are a basic price Company?—That is so.
>
> 894.—And your basic price, within the whole of your limits of supply, except some comparatively small parts added later to your limits, is 7d. per therm?—It is.
>
> 895.—How does that basic price of 7d. per therm compare with the basic price of other gas undertakings in this country?—I should say, with the exception of one, that it is the lowest. I think the basic price of the Bath Gas Company is lower.

Yours, &c.,
R. HALKETT,
General Manager and Secretary.

Sheffield Gas Company,
Commercial Street, Sheffield,
June 4, 1934.

THE NEWS OF THE WEEK

Congratulations to the *American Gas Journal* on attaining their 75th Anniversary and on the excellent Anniversary Number published to commemorate the event.

The Austrian Gas and Water Engineers held their 53rd annual meeting in Vienna on May 26, when among the papers read was one by Prof. Dr. Grassberger and Dr. Ing. Luszczak on "The Gas Flame as an Air Tester," and one by Dr. Dollinger on "Coke Economy in Gas-Works."

Steel Production at Dortmund.—On page 464 of the "JOURNAL" for May 23, in the course of Major M. Koopman's reply to the discussion on his paper on the Utilization of Coke Oven Gas, he was reported to have said that at the Hoesch Works at Dortmund they produced a ton of steel on a consumption of 14 therms on the average. Major Koopman points out that this should be *44 therms*.

Notice of Motion has been given to the Manchester City Council calling upon the Parliamentary Committee to consider and report upon the desirability and practicability of making smokeless fuels available to the public at such cost (if necessary involving a charge upon the rates) in relation to raw coal as will promote their use in preference to coal. The purpose underlying this motion is to ensure a cleaner atmosphere in Manchester.

An Illustrated Article is published in the May issue of *Baths and Bath Engineering* giving particulars of open-air swimming pools floodlighted by gas. The lighting installations described are at Enfield, Dagenham, and Plymouth. The article points out that, with gas, efficiency is accompanied by economy, and states that there is little doubt that the coming summer will see a marked extension of installations of gas for this purpose.

Fifty-seven Members of the Stroud Gas Light and Coke Company's Social Club visited the Showroom of Messrs. Falk, Stadelmann, & Co., Ltd., 83-93, Farringdon Road, London, on June 2, and were received by Mr. H. Falk, a Director of the Company. After viewing all the various appliances exhibited, they were conveyed by coach to the Veritas Mantle Factory at Wandsworth, where, after a tour of inspection, refreshment and lunch was served. During the afternoon they made a tour of London.

Gas Convener's Optimism.—Councillor Muter, Edinburgh's Gas Convener, spoke last week at a luncheon given to an official party visiting the Granton Gas-Works, where they viewed the benzole extraction plant in operation. The Gas Industry, he said, should emulate their electrical rivals and establish a gas grid. There were various gas undertakings within 20 miles of Edinburgh and there was no reason why these should not be served by the huge undertaking at Granton. The Gas Industry had a great future.

Gas Production in Austria.—According to a return just issued by the Austrian Gas-Works Association 73 towns and villages in Austria are now supplied with coal gas by a total of 25 undertakings, twenty of which are owned by municipal authorities and five by private companies. The production of gas during the past year shows a decrease of 4·22%, the total output being 12,598 million c.ft. The municipal undertaking in Vienna, which comprises two works, is the largest in the country, accounting for 89% of the total production.

Gas Progress in Japan.—In a recent issue of the *Journal* of the Fuel Society of Japan a summary is given of a report lately issued by the Japanese Department of Commerce and Industry on the production of gas in Japan during 1932. Despite an increase in the number of consumers in the country from 1,726,344 at the end of 1931 to 1,790,986 at the close of 1932, the industrial depression resulted in a decrease in the total production from approximately 28,316,000,000 c.ft. to 27,179,129,000 c.ft. The report shows that at the end of 1932 there were 101 gas undertakings in Japan with a total of 126 works—an increase during the twelve months from 94 and 121 respectively, while the length of the distributing mains advanced from about 7,940 to 8,480 miles.

Abolishment of the Offices of Chief Gas Examiner and Referees.

Board of Trade Proposal.

The following is a copy of a letter which appeared in *The Times* for June 4, 1934:

SIR,—It has been authoritatively stated that no single commodity, the supply of which is in unofficial hands, is more carefully watched and maintained at its guaranteed quality than town's gas, and indeed that gas and water are the two things ordinarily bought which are best worth while.

The reason for this, as far as the former is concerned, may be traced to the fact that the gas supplied in the Metropolis has been for upwards of seventy years under the supervision of a small body of "Referees" (actually three in number), who have been responsible for prescribing the methods by which the standards of quality and purity, &c., laid down by the Legislature should be ascertained. Their functions have been supplemented by that of a Chief Gas Examiner, who passes in review the whole of the results of such testings and adjudicates upon appeals made either by the gas company or the public authorities as to compliance therewith. These persons are required by statute to be "competent and impartial," and, once appointed, they are not subject to interference by the appointing authority—in this case the Board of Trade. The result has been that not only have the public been protected by their overseeing authority, but the gas companies themselves have been ensured that the oversight given has been not only impartial but competent. When it is borne in mind that during the last sixty years or so men of such outstanding position and authority as Prof. John Tyndall, Prof. Vernon Harcourt, Dr. William Pole, Dr. C. V. Boys, Dr. J. S. Haldane, and Mr. W. J. A. Butterfield have, among others, occupied the position of Gas Referee, while that of Chief Gas Examiner has been filled by Dr. Alexander Williamson, the late Lord Rayleigh, and Sir Richard Glazebrook, it will be realized how great an influence for good has been the system which, after so many years of trial, continues in successful course to-day.

In these circumstances it is difficult to understand what motive has prompted the Board of Trade to take advantage of their promotion of the Gas Undertakings Bill, now before Parliament, designed primarily to give effect to the conclusions of a Committee which sat under the Chairmanship of Mr. F. J. Wrottesley, K.C., to tack on thereto a proposal to dispense with the services of the present Gas Referees and Chief Gas Examiner and the long-existing system they represent, and to appoint in lieu thereof another more bureaucratic and unstable one, the suggestion for which certainly never came before, and was never considered by, that Committee.

It may be suggested, on behalf of the proposed change, that the replacement of the present holders of the offices would be no easy matter. Surely this cannot be true, for though eminent men are always scarce, among present occupants of Chairs of Physics and Chemistry at our Universities there are men of outstanding merit who, retired perhaps from active participation in educational work, would be willing to place their services at the disposal of the Gas Industry when, owing to retirement or death, vacancies arise.

I cannot believe that the proposed changes have had the acquiescence of the present Referees or the Chief Gas Examiner, and, speaking for two out of three of the Metropolitan Gas Companies, whose interests are vitally concerned and who have never been consulted with regard to the suggested alterations, I earnestly urge the abandonment of the proposal.

I am, Sir,

Your obedient Servant,

(Sgd.) CHARLES CARPENTER.

South Metropolitan Gas Company,
709, *Old Kent Road, S.E.* 15,
June 2.

THE NEWS—*continued.*

Road Vehicles Propelled by Coal Derivatives.

Demonstration at Westminster.

On June 6, 7, and 8 a demonstration of road vehicles propelled by some derivative of British coal will be organized by the Coal Utilization Council in Old Palace Yard, Westminster, by permission of the Lord Great Chamberlain.

The demonstration, which members of the Institution of Gas Engineers are invited to attend, will last from 11 a.m. till 5 p.m. on each day. The Secretary for Mines, who has accepted an invitation to be present, will be received by Lord Gainford on behalf of the Council. The Ministry of Transport is also expected to visit the demonstration.

Among those collaborating with the C.U.C. in this demonstration will be:

The Sentinel Waggon Works, Ltd., which will show a silent, smokeless, steam-driven lorry running on pneumatic tyres.

The Gas Light and Coke Company, showing a 30-cwt. lorry which has run 20,000 miles on creosote without overhaul.

The National Gas Council, with a lorry running on compressed gas which has been lent by the Wandsworth Gas Company.

The Chesterfield Tube Company (the undertaking that manufactures the cylinders for the compressed gas), which will show a municipal dust cart converted to run on compressed gas.

The Koela Producer-Gas Plant Company, Ltd., with a producer-gas driven vehicle.

Low Temperature Carbonisation, Ltd., showing a lorry and also a private Rolls Royce car driven on petrol produced from coal.

The Fuel Research Board, which is supplying for one of the vehicles in the demonstration petrol produced from hydrogenated tar.

Sir Arthur Duckham Memorial Fund.

Official List of Donations from May 26 to June 1.

Name and Town.	Amount. £	s.	d.
Australian Gas Light Company, Sydney	50	0	0
British Commercial Gas Association, London	25	0	0
Clayton, Son, & Co., Ltd., Leeds	5	5	0
Dr. and Mrs. Cohen, Aldershot	3	3	0
Cupar Gas Company, Ltd.	3	3	0
James Douglas, London	5	5	0
Gas Institute of New Zealand (Incorporated)	5	5	0
Goodall, Clayton, & Co., Ltd., Leeds	5	5	0
Mr. and Mrs. G. H. Grace, Ewell	2	2	0
Richard Miles, Thornaby-on-Tees	2	2	0
Oxford and District Gas Company	25	0	0
Shrewsbury Gas Light Company	5	5	0
H. Singleton, Huddersfield	3	3	0
P. M. Stewart, O.B.E., J.P., London	10	0	0
Stourport Gas Company	1	1	0
Yeadon and Guiseley Gas Company	4	4	0
Donations (16) paid above	£ 155	3	0
Donations (577) paid previously	9,602	8	2
Total Donations (593) paid	£9,757	11	2
Donations (7) promised	571	7	0
Total Donations paid or promised	£10,328	18	2

Unique Record of Industrial Employments.

We have received from the Director of Education of the City of Liverpool a pamphlet—the ninth of a series issued by the Liverpool Education Committee, in co-operation with other Merseyside Educational Authorities and the Ministry of Labour—dealing with the various occupations open to young people in the area. The aim of this pamphlet, entitled "Merseyside Employments," is to provide parents and guardians with the detailed information that will enable them to advise young persons, of the school-leaving age, in selecting their future careers.

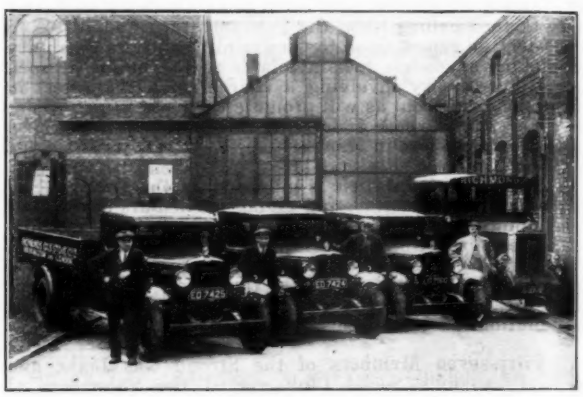
All the industries on Merseyside are considered separately, and an attempt has been made to suggest the atmosphere and nature of each sphere of work and the particular personality suited to it. Information is given regarding conditions of employment, rates of wages, where possible, trade journals, periodicals recommended for study and reading, and books in the Merseyside Libraries bearing upon the respective industries. The pamphlet includes a section relating to Gas Manufacture, setting forth the nature of the work done by labourers and shift-workers, with their minimum rates of pay.

Prof. Piccard's Rivals.

A Balloon Race organized by the Bedford District Gas Company on Whit Monday has had an interesting result. A strong north-westerly wind was blowing, and no fewer than six balloon labels have been returned from the Continent. These seem to have crossed the Channel and followed the Rhine to its source, a total distance of approximately 500 miles.

Balloons were picked up at the following places: Hunsweert, Holland; St. Trond, Belgium; Hamme, Belgium; Saverne, Bas-Rhin, France; Utzenfeld, Baden, Germany; and Steinach, St. Gallen, Switzerland.

An Enviable Record.



At a time when every effort is being made to reduce the appalling number of accidents on the road, it is with special satisfaction to be able to record that all the lorry drivers in the employ of Richmonds Gas Stove Company, Ltd., of Warrington, have now qualified for the Silver Medal of the National "Safety First" Association awarded to drivers who have driven commercial vehicles for five consecutive years without an accident. The medals were recently presented at Liverpool by the Lord Mayor. It is also interesting to know that the four lorry drivers shown in our illustration have been driving for the Richmond Company for 15 years without having had any accident during the whole of that time—an excellent record.

Plan for Reconstruction at Swindon.

To cope with an increased demand for gas, the Swindon United Gas Company have decided completely to reconstruct and modernize their plant by the installation of a series of twelve intermittent vertical chamber ovens and a coke screen and grading plant at a cost of £25,000. The contract has already been let to Messrs. W. J. Jenkins & Co., Ltd., of Retford, and the work will be put in hand in about three months' time. The Company intend to apply to the Board of Trade for permission to extend their area of supply to include a number of surrounding villages. In anticipation of permission being forthcoming, a five-year plan has been drawn up, and will mean the laying of 27 miles of mains, bringing the total mileage to 120. The cost of this extension will be roughly £30,000.

The Directors have been encouraged to embark upon these schemes by the increase in the load during the last two years. In 1933 the increase was more than 20 million c.ft., and to date there has been a further increase of 10,250,000 c.ft. Last year the sales of appliances more than doubled the figures for 1932; this year, sales are showing a 17% increase compared with the same period of last year.

THE NEWS—continued.

British Standard Chemical Lead.

A revision of B.S. Specification No. 334, Chemical Lead, has just been issued.

The specification was first issued in 1928 and as a result of the experience that has been gained by its adoption it was found that a number of amendments were desirable. These have been embodied in the revised specification. The use of lead to which alloying elements have been added has increased rapidly. The scope of the specification has therefore been extended to provide for two types of lead—Type A and Type B. Type A lead corresponds to the quality of lead covered by the original specification, and Type B provides for lead to which alloying elements have been added.

Additional requirements have also been included specifying the method in which the samples for analysis should be taken. All the tests have been carefully reviewed and a number of details have been modified so as to remove certain ambiguities and to make the methods of carrying out the tests clearer with a view of securing greater uniformity in results.

Copies of this British Standard Specification (No. 334—1934) may be obtained from the Publications Department, British Standards Institution, 28, Victoria Street, London, S.W. 1, price 2s. 2d. post free.

EXHIBITION AND CARNIVAL

The Harwich Gas and Coke Company, Ltd., recently organized a successful Gas Exhibition, together with cookery lectures and demonstrations. The photograph, kindly sent us by Mr. A. Gregory, the Manager and Secretary, shows the excellent floodlighting of the Alexandra Hotel, where the Exhibition was held.

Enterprise was shown recently by the Winsford Urban District Council Gas Undertaking in the holding of a very successful gas exhibition during which demonstrations of cooking, washing, and permanent hair waving were given. Our photograph, kindly sent by Mr. J. H. Booth, Engineer and Manager, is of considerable interest in that the exhibition was held in a cinema which had no windows, so that the picture had to be taken by the gas lighting temporarily installed for the exhibition period.

Mr. G. Wilks, Secretary and Commercial Manager of the Watford and St. Albans Gas Company, has kindly sent us the above photograph of the Company's lorry which was entered in a procession organized by The Watford Peace Memorial Hospital Saturday Fund at a Whit Monday Carnival. The lorry was awarded a first and a second prize in two different classes. The design was prepared under the direction of Radiation Ltd. The following day the lorry toured the Company's area.

A TECHNICAL SIGNPOST : TO THE "JOURNAL" :

Vol. 205, January-March, 1934

GENERAL.

The annual comparison of the working results of the Metropolitan and Suburban Companies has now been published and as usual constitutes a useful guide to the progress of the Industry (p. 610). Gas sales show, in general, a slight decrease which is largely attributed to abnormally warm weather. The average price of gas has not been altered, and there has been little change in the revenue from bye-products. With the exception of coke, however, all of these have slightly increased in value. In regard to manufacturing costs, the Commercial Gas Company again leads the way with a net coal figure of 1·17d. and a net distribution and manufacturing cost of 5·92d. There is, however, a difference of only 0·12d. between the costs of the three Metropolitan Companies. The gaseous thermal yields form an interesting comparison. Three Companies which carbonize solely in horizontal retorts have thermal yields of 75·71 (South Metropolitan Gas Company), 74·63 (South Suburban Gas Company), and 72·05 (Commercial Gas Company). These figures may be compared with the yield of 75·05 for the Gas Light and Coke Company whose gas is manufactured from a variety of different types of settings.

The policy of the amalgamation of capital of adjacent Undertakings has now spread to the south-west of the country where the South-Western Gas Corporation has been formed to acquire Undertakings in Devon and Cornwall (p. 542). Shares in this Company have been allotted in part purchase of the various companies in the above areas.

CARBONIZATION.

Working results from two new installations of C.O.L. chamber ovens—at Brentford and at Vancouver (B.C.) respectively—have now been published (p. 91). The Brentford installation consists of two units, each of a capacity of 5 million c.ft. per day, but only one of these units has been completed and put into operation. The 48 chambers, which each take a charge of 4·2 tons of coal, are heated by hot producer gas from internal producers. The Vancouver plant which has already been described in the "JOURNAL" (Vol. 202, p. 278) comprises 24 chambers of the above size, but the heating gas is provided by Lymn-Rambush mechanical producers. Comparative results from the two installations are tabulated below, viz.:

—	Brentford.	Vancouver.
Weight of charge, tons	4·14	4·07
Steam used, %	..	18·70
Gas yield, therms per ton	80·3	95·2
,, , calculated on inert free coal basis	89·4	115·4
Calorific value, B.Th U. per c.ft.	510·2	473·7
Inerts in gas, %	7·9	15·3
Coke, cwt. per ton	..	13·5 (calc.)
Fuel consumption, %	14·59 (dry)	24·0 (dry)*
Maximum flue temperature, ° C.	..	1,282

* Net figure after allowing for coke equivalent to steam raised.

In regard to the thermal yield, the two plants are not strictly comparable, since different varieties of coal were carbonized. The considerably higher fuel consumption of the Vancouver plant is noteworthy, this being presumably attributable to the loss of sensible heat of the producer gas. At Brentford, some 16 different varieties of Durham coal were tested, the yield of gas varying from 77·5 to 82·4 therms per ton.

Results have been published relating to the new intermittent vertical retorts or "West-verticals" recently introduced by West's Gas Improvement Company, Ltd. (p. 493). Two of these retorts have now been built at Dudley and another unit is to be erected in Holland. The retorts at Dudley on which the following results were obtained are 90 in. by 9 in. at the top widening to 96 in. by 14 in. at the bottom, an unfilled space of 2½ ft. being left above the charge for cracking purposes. Further details of the construction of these chambers are given in the "JOURNAL" for Oct. 18, 1933, the feature of particular interest being the provision of an internal coke cooling chamber. This holds the coke equivalent to a complete charge of coal. The coke, after being steam quenched, passes to a separate discharge chamber, which in two or more emptyings will discharge the coke from the cooling chamber. The retorts have been worked with 8 to 12 hour charges producing a gas varying in calorific value from 435 to 489 B.Th.U. Unfortunately no gaseous thermal yields are given. It is claimed that the proportion of breeze produced is considerably lower than in the case of the continuous vertical retort; thus the percentage of coke over 1 in. is 83% compared with 69% from continuous vertical retorts—presumably from the same coal. The results of comparative shatter tests are also given and tend to show that the coke is stronger than that obtained from continuous vertical retorts.

Further information is now available regarding the experiments which are now being carried out at Birmingham to increase the coal gas yield in continuous vertical retorts by leaving a cracking space above the coal charge (p. 195). From tests in which the top of the charge was fixed at various distances from the gas outlet, it was found that the best results were obtained when the charge was 7 ft. below the top of the retort. Under these conditions a yield of 84·8 therms per ton (C.V. 528 B.Th.U.) was obtained when using 14·5% of steam, as compared with 81·6 therms (C.V. 477 B.Th.U.) using 12·3% of steam under normal conditions in a fully charged retort. As would be anticipated, the throughput was lower with the partly charged retort, due to the decreased heat surface, a reduction from 6·1 to 5·2 tons per retort per day being obtained. For comparative purposes, it may be noted that the carbonization of the same coal in horizontal retorts yielded 72·0 therms per ton at a calorific value of 543 B.Th.U., this being equivalent to a yield of 87·5 therms if the calorific value were reduced to 475 B.Th.U. by steaming as in the vertical retort.

These results show clearly that the coal gas yield is considerably lower in the vertical retort owing to inefficient cracking. A number of practical difficulties were encountered. To maintain the coal in the required position, the rates of coal feed and coke extraction must be synchronized, while, with a dusty coal, there is a tendency for dust to be carried forward with the gas. By feeding the coal through a pipe which extended to the top of the charge these difficulties were overcome, and it was found that, provided the velocity of the coal in the pipe did not fall below a given minimum value, the coal flowed freely through the tube. A reduced throughput is, however, inherent to the process as is also the reduced steaming efficiency due to shorter travel of the gases in the retort. These disadvantages must be carefully considered in relation to the higher yields obtained in order that an economic balance be maintained.

A useful review of the factors determining the cost of maintenance of vertical retorts has been given by Finlayson (p. 148). Comparison of maintenance costs of different plants is unsatisfactory, since the methods of costing are nearly always different. In regard to the "W.-D." vertical retorts, however, a figure of 9·25d. per ton of coal carbonized is suggested as representing an average cost. In discussing the provision of suitable steelwork the author suggests that, in view of the greatly improved types of cast iron which have been recently introduced by the British Cast Iron Research Association, this metal will in the future replace steel for many purposes where corrosion is likely to be a serious factor. The maintenance of a positive pressure in the retort is recommended, although this may

result in a loss of gas by leakage. To reduce this loss the bottom part of the retort where there is little scurf formation should be regularly sprayed.

One of the most serious items in the maintenance of vertical retorts is due to the spalling of the silica work. In this connection it is suggested that although scurfing may lead to spalling it is not necessarily the major factor, and spalling is attributed rather to " heat racking " of the material due to sudden and violent temperature changes. In this connection it is interesting to note that a new installation of Glover-West vertical retorts has been in operation at Wellingborough for some 18 months without any sign of spalling or flaking of the silica work (p. 684). Special care has been taken to ensure that during scurfing the temperature of the retort does not exceed that which obtains under normal carbonizing conditions. It will be interesting to know whether the continuation of these conditions will prevent spalling when the material has had a somewhat longer life.

A new installation of the smaller " W.-D." retorts—*i.e.*, 44 in.—has been erected at Gainsborough (p. 304). The six retorts have a capacity of 548,000 c.ft. per day and are independently heated, the upwards combustion system being applied.

The plant of the Bussey low-temperature process at Glenboig, after a rather chequered history, has been taken over by a concern known as the Scottish Gas Utilities Corporation, and since February, 1933, has been producing daily over 3 million c.ft. of low-grade gas with a calorific value of 200 B.Th.U. (p. 609). In addition, a low-temperature coke is being sold which, it is stated, contains only 5% of ash.

PURIFICATION.

According to a recent German article by Broche (p. 90), the Thylox and other processes of liquid purification offer no advantages from the standpoint of costs, as compared with the standard methods of oxide purification. It is considered, however, that in the oxide process there is considerable scope for improvement. Thus the capacity of existing plants is largely determined by the time required to revivify the sulphided material in the boxes, this reaction being much slower than the corresponding sulphiding reaction. The oxidation, however, can be considerably accelerated by an increase in temperature. It is therefore proposed to divide the boxes into two sets, in one of which the oxide is being sulphided and in the other undergoing revivification. The gas entering the latter is heated to 105°-120° F. and saturated with water to prevent the drying of the oxide. It is claimed that by this process the throughput may be increased by about 100%.

Another modification of the oxide purification process is the Raffloer system, which has now been under investigation in Germany for some years (p. 465). The ordinary purifier is replaced by a vertical tower in which spheres of a specially prepared oxide are supported in a system of louvres. The spheres are 0·6 in.-0·8 in. in diameter, and although they have a porosity of 60%, the bulk density of the charge is as high as 44 lbs. per c.ft. which may be compared with a figure of 21 lbs. per c.ft. for ordinary bog ore, &c. Gas and air are passed through the tower alternately, and complete removal of the hydrogen sulphide is claimed. The lowest layer is discharged every three days, the spent balls containing about 45% sulphur, which is extracted by carbon bisulphide and the balls re-charged to the tower. No indication is, however, given as to whether there is any disintegration of the balls or to what extent their efficiency decreases due to absorption of hydrocyanic acid, tar, &c. Obviously their effective life will be strictly limited, and, unless this is considerably greater than that of oxides normally used, the greater initial cost will not be justified. The cost of purifying 3½ million c.ft. per day is given as 0·062d. per 1,000 c.ft., this being based on results obtained on a small experimental unit.

An explanation of the replacement of moist by dry lead acetate papers in the Gas Referees' Test for hydrogen sulphide has been given (p. 253). Dry test papers are less sensitive than the moist papers and show less colouration when exposed under identical conditions. Further, they are easier to handle in the operation of the test. It is recalled that in 1930 the area of the paper exposed was increased, a change which also tends to reduce the sensitivity of the test.

The physical laws governing the equilibrium between gases and solutions are discussed by Hollings and Silver in relation to the general problem of gas washing, but with particular reference to the gas-works processes (pp. 307, 372). The rate of absorption is regarded as being controlled by the thickness of the films of gas and liquid at the interface between the two phases, through which films movement only occurs by diffusion, there being no convection currents to aid the transfer of the dissolved gas molecules from the film to the main body of the solvent. From theoretical considerations the following formula is derived:

$$\frac{KgA}{V} = \frac{qk}{qk-1} \operatorname{Log}_e \left(\frac{qk - 1 + S}{qkS} \right)$$

Where: A = Scrubbing area (sq. ft.).
V = C.ft. gas per hour.
Kg = Transfer coefficient (lbs. absorbed per sq. ft. with a difference of 1 lb. per c.ft. between the concentration in the gas and the liquid).
q = Ratio of the volume of wash liquor to volume of gas washed.
k = Partition coefficient.
S = Proportion of solution unabsorbed at outlet of washer.

Values are given for Kg and k for various gases and solvents—viz., absorption of NH_3, SO_2, and H_2S in water. Laboratory experiments under carefully controlled conditions gave results which, in general, agreed with those calculated by the various formulæ, which, it should be noted, only apply to the absorption of gaseous constituents which do not enter into chemical combination with each other or with the solution. Further, it is assumed that the surface of the packing of the washer is uniformly wetted. Thus, its application to the design of large-scale plant will require the interpolation of several factors to account for the various conditions which are not considered in the formulæ. The work is further extended to a consideration of the performance of multi-stage washers such as the rotary brush washer, &c. Results are given showing the relationship between the strength of ammoniacal liquor, the percentage slip, and the variation in concentration of ammonia in the gas and liquor in successive bays of a washer. These values agree well with results calculated on the basis of the film transfer coefficients combined with the use of a graphical construction to determine the change in concentration in passing through a washer. It is concluded that the multi-stage washer is unsuitable for absorption of gases of low solubility, for which the tower scrubber should be used.

COKE.

Despite the multiplicity of methods already in existence for obtaining figures relating to the combustibility or reactivity of coke, new suggestions continue to be advanced (p. 201). In the method recently proposed by the Northern Coke Research Committee, air is passed over heated coke and the minimum air flow at which combustion will continue for longer than an arbitrarily fixed period is determined. An " active " coke will continue to burn in a very slow air stream, and the greater the minimum rate of combustion the lower is the reactivity of the coke. It is stated that tests on some 30 cokes have given results which are generally in agreement with the order of reactivity as predicted from general observations. The Scottish Coke Research Committee have been investigating the fracture of coke which takes place when the majority of the volatile matter has been expelled, and some correlation is claimed between the strength of the coke and the percentage of residual volatile matter when fracturing takes place (p. 676).

The progress of the sales of gas coke was discussed at the Annual Meeting of the London Counties Coke Association, when it was stated that the total inland sale of this Association for 1933 was 2,600,000 tons. The new tax on fuel oils has resulted in a number of firms replacing oil by coke firing, and it was hoped that this, together with the development of an automatically controlled coke boiler in which is incorporated an automatic coke feed and thermostatic temperature control, would result in a considerable increase in the sales of coke.

While considerable sums are being expended in this country on plant for coke treatment and on appliances suitable for the combustion of coke for various purposes, it is curious to read in the Presidential address to the Australian Gas Association that in Melbourne, coke is regarded as a more or less undesirable product (p. 94). Apparently the coke market is very unsatisfactory, and the policy adopted is to gasify as much of the coke as possible—in fact, complete gasification is advanced as an ideal.

The quantity of breeze which is produced by the breaking of large coke is always a serious item on the cost sheet of coke treatment, and the various breaking machines have been devised with the object of reducing the proportion of this grade of material. For a new breaker and cutter which is being marketed by West's Gas Improvement Company, Ltd., very low breeze figures are claimed, although no actual results are given (p. 147). This machine is comprised of a single roller on which are mounted seven helical cutters working against a spring-loaded breaker plate.

TAR PRODUCTS.

Several references have been made to the difficulties experienced in South Australia in the manufacture of suitable road tars from vertical retort tars (pp. 206-259). Various bitumen preparations have been found to give good results

under Australian conditions, and gas undertakings have been forced to market a product, the properties of which are similar to those of bitumen. Some companies have mixed tar and bitumen in various proportions, a typical product containing 60% bitumen and 40% tar. Another process, which has been previously worked, consists in blowing air through a vertical tar to polymerize the unsaturated hydrocarbons. This action alone did not give a satisfactory product, and, latterly, vulcanized triglycerides, which are available from other industries, have been added, these compounds decomposing to aldehydes, which subsequently undergo polymerization. The final product is stated to be similar in its properties to natural bitumen.

For the separation of tar and water emulsions, an apparatus is proposed which consists of a vertical cylindrical tank in which the emulsion is heated to 80° C. by hot water coils (p. 753). The water flow is downwards, so that the hottest water is at the top and convection currents do not seriously interfere with the separation of the tar and water.

An investigation of the mechanical tests applied to determine the suitability of various tar products for road surfacing, &c., is being carried out in a laboratory specially equipped for the purpose at the Products Works of the Gas Light and Coke Company (p. 99). Preliminary work has been concerned with the standardization of suitable methods for the preparation of the test specimens. Their size and shape must be carefully considered in relation to any particular test, together with the size of the aggregate and the method of admixture with the binder. Several methods of preparation of the test specimens have been examined—*i.e.*, by tamping, ramming, compaction under gradually applied load or by roller action. The conditions of test include such factors as temperature and method of application of load. Various tests have been applied. In addition to the usual tests for impact and tensile and compressive stresses, the material is subjected to a sand-blast attrition test to obtain some idea of its wearing properties.

BENZOLE EXTRACTION.

The growing popularity of benzole extraction may be judged from the large number of papers which are being contributed on this subject, these being mainly devoted to descriptions of the design and the results obtained from new installations.

At Chester, where benzole is extracted from horizontal retort gas, a yield of 2·03 gallons per ton of coal has been averaged over the past six months (p. 625). Some 35-50 gallons of oil (gas oil) are circulated per ton of coal, and the consumption of oil per gallon of benzole is given as 0·58 gallons. The sulphur compounds in the gas are reduced from 22·0 to 15·6 grains/100 c.ft. The plant is automatic in operation, the only difficulty experienced being the formation of oil-water emulsions in the coolers.

Another plant has been erected at Stoke-on-Trent, this being capable of extracting 1,200 gallons of crude benzole per day (p. 675). Doubt has been expressed as to the economy of benzole extraction from vertical retort gas in view of the high proportion of paraffins present, but there are now several plants successfully operating on this type of gas. At Swindon an average recovery of 2·3 gallons per ton is being maintained from a gas with a calorific value of 480 B.Th.U. (p. 551). The distillation of the spirit yields only 75% below 120° C., which is, of course, a relatively low-grade product, and a yield of only about 1½ gallons would be obtained if a higher grade spirit was produced. The total cost of extraction is given as 5·33d. per gallon and the revenue as 10·44d., leaving a net profit of 5·11d. per gallon.

In regard to the extraction by active carbon, a comprehensive paper has been given by Hollings which deals with the results obtained in the large plant at the Beckton works of the Gas Light and Coke Company and also on a small plant at the Harrow works of this company (p. 741). Details of the construction of the plant and methods of working have been given elsewhere and need not be again discussed. Both installations have now been working for some time, and the average results obtained are given below.

—	Harrow.	Beckton.
Period under operation, months	12	18
Benzole per ton of coal, galls.	..	3·1
Extraction efficiency, %	93–95	92
Carbon used per 1,000 lbs. benzole (average), lbs.	6·8	7·1 (5·7)
Steam per gall. of benzole (average), lbs.	27·2	36·6 (30·0)

Rather better results are shown by the smaller plant at Harrow, but results from half of the Beckton plant over a long uninterrupted run, which are shown in brackets, are practically the same as those obtained at Harrow. The lower average results at Beckton are attributed to various causes incidental to the initial working of a new plant. It is stated that the efficiency of extraction by active carbon is about 5% greater than is obtained by oil washing while the steam consumption is definitely lower. No serious difficulty has been encountered in the working of the plant apart from corrosion of the cooling coils, which was remedied by using a closed circulation system with condensed and de-aerated steam.

The removal of benzole carries with it a most important advantage in that some of the organic sulphur compounds are simultaneously absorbed. In the case of the oil-washing process, the percentage of sulphur removed—as carbon disulphide and thiophene—is a function of the quality of wash-oil used. Thus, by the use of one gallon of wash-oil per 1,000 c.ft. some 30-40% of the sulphur can be removed. If this circulation is doubled, the extraction is increased to 60%. The active carbon process is much more efficient. At the commencement of a normal absorption cycle, practically the whole of the sulphur is absorbed, but the more volatile compounds are displaced as the carbon becomes saturated. Large-scale results indicate an extraction of 75-85% of the sulphur, this being equivalent to leaving only 7-8 grains/100 c.ft. in the treated gas.

In regard to the quality of the benzole recovered, the more efficient absorption by carbon results in a higher sulphur content. Thus, with oil-washing, the sulphur may vary from 0·55 to 0·9%, and with carbon from 1·15 to 1·90%. To manufacture spirit with less than the specified limit of 0·4% sulphur, it is necessary to remove the carbon bisulphide and some of the other compounds by distillation. Apart from this impurity, however, the crude benzole does not require distillation before refining. The loss on acid refining is heavier with the carbon extracted benzole owing to the presence of a greater proportion of paraffins. This loss does not occur when using the new inhibitor process, although to maintain the sulphur content below the limit of 0·4% it has been necessary, in some cases, to treat a proportion of the benzole by acid and thereby remove the sulphur, this spirit being then mixed in suitable proportions with the spirit treated by the inhibitor process.

AMMONIA.

From the annual report for 1932-33 of the Sulphate of Ammonia Federation it is noted that the agreement effected in 1933 between English and Continental manufacturers of this product has been confirmed for another year (p. 43). It is therefore safe to assume that the rather higher price which is now been obtained for sulphate of ammonia will be continued. Both the home and the world consumption of nitrogen products have increased in the past year, which is presumably attributable to the low ruling prices. The home consumption of sulphate of ammonia was 10,705 tons—an increase of 5%—but this increase is entirely supplied by the synthetic product, the output of bye-product salt decreasing by 11%—viz.:

	1931-32.		1932-33.
Bye-product sulphate	301,655	..	266,703
Synthetic sulphate	522,207	..	574,105
Total	823,862	..	840,808

There is, however, a tendency for more bye-product salt to be manufactured following the advance in price. In regard to the manufacture of other ammonia compounds, it is reported that experiments are being made at Melbourne to produce ammonium polysulphide for use as an insecticide (p. 206). This compound is used in this country for this purpose, but on such a limited scale that its manufacture in any appreciable quantity would quickly saturate the market. At Buxton, crude ammoniacal liquor is being run into the sewage system (p. 819). The flow is strictly controlled to give a constant rate, and no difficulty has so far been experienced. It is, in fact, suggested that the working of the sewage beds has been improved rather than hindered by the presence of the liquor. The liquor in question is manufactured from hand charged horizontal retorts.

STORAGE.

Some details have been given regarding the reconditioning at Buxton of a two-lift spiral holder and the addition of a third lift (p. 820). The steel tank which is largely above ground was strengthened by electrically welding a series of bars 1 in. by ⅜ in. to the outside of the tank plates. Thirteen rows of bars were added in all. It is of interest to note that after working for thirty years there was found to be little evidence of corrosion of the tank plates. A new spiral holder of a capacity of 300,000 c.ft. has been erected at Shipley, an existing holder tank being utilized for this purpose (p. 548). After considering the alternative methods of construction—viz., rivetted and welded joints—it was decided to adopt the former in view of the tendency to distortion and the possibility of corrosion of the weld when in contact with coal gas.

City and Guilds of London Institute

The following questions were set in the City and Guilds of London Institute Examinations for 1934 in the subjects named:

MINOR COURSE IN GAS-WORKS PRACTICE.

Tuesday, May 1, 7 *to* 10 *p.m.*

(Not more than six questions to be attempted. The maximum number of marks obtainable is the same for each question.)

1. Crude coal gas leaving the hydraulic main of a carbonizing bench contains substances which must be partially or wholly removed from it before it is admitted to the gasholder.
   (*a*) Enumerate these substances, stating the proportions in which you would expect each to be present.
   (*b*) In what order are they removed? Give (briefly) the reasons for which this order of removal is adopted.
2. Sketch the generator only of a carburetted water gas plant for hand operation, capable of producing about one million c.ft. of gas per twenty-four hours. Mark the portions of the fire-brick lining first likely to require renewal.
3. (*a*) What do you understand by the "Calorific Value" of a gas?
   (*b*) The following observations were made in the course of a test of the Calorific Value of town gas, using a Boys' non-recording calorimeter:
   Gas passed, ½ c.ft.
   Corrected volume of water collected, 1,958 cub.cms.
   Barometer, 29·90 in. } Gas Volume Factor
   Meter thermometer, 61° F. } 1·006.
   Corrected rise in water temperature, 21·30° C.
   Calculate the Calorific Value of the gas tested. (1 kilogram = 2·204 lbs. Tables of logarithms may be used.)
4. Sketch a four-bladed exhauster, and describe its operation. (A sketch of the engine driving the exhauster is *not* required.)
5. A retort setting requires repairs or renewal after a certain period of use. Explain, *either* by reference to a setting of horizontal retorts, *or* by reference to a setting of continuous vertical retorts, how the necessity for such repairs or renewal makes itself apparent in the working of a setting and in the operating results obtained therefrom.
6. To what points should attention be given in the inspection and maintenance of a gasholder?
   (Illustrate your answer by reference to any *one* type of holder.)
7. Describe the "backward rotation" system of operating oxide purifiers. What are the advantages to be derived from the use of this system?
8. In what gas-works processes or operations is the "counter-flow" (or "counter-current") principle employed? State in each case mentioned the purpose for which the principle is used.

MINOR COURSE IN GAS SUPPLY PRACTICE.

Tuesday, May 1, 7 *to* 10 *p.m.*

(Not more than six questions to be attempted.)

1. What are the functions of gasholders in relation to the distribution of gas? *(20 marks.)*
2. Describe and sketch a drill stand suitable for making a service connection to a cast-iron main with a minimum loss of gas. *(30.)*
3. (*a*) What conditions are likely to lead to the exterior corrosion of service pipes?
   (*b*) State what protective measures you would apply when laying a service pipe in soil where you would expect corrosion to occur. *(30.)*
4. Under what conditions would you use the following materials for interior fitting work?
   (*a*) composition (compo) piping,
   (*b*) wrought-iron tubing? *(20.)*
5. Sketch and describe a type of lamp suitable for outside shop lighting. *(30.)*
6. What are the modern essential points to be considered in street illumination? *(20.)*
7. Describe the working of a thermostat when attached to a cooker. *(30.)*
8. How is the speed of a gas engine governed? *(20.)*

GAS FITTING.

Grade I.

Monday, April 30, 7 *to* 10 *p.m.*

(Not more than six questions to be attempted. The maximum number of marks obtainable is the same for each question.)

1. Make a list of the tools that you would require to cut and screw a piece of ½-in. barrel. Give a sketch of any one of these tools.
2. What do you understand by the following:
   (*a*) A blown joint,
   (*b*) a screwed joint,
   (*c*) a flanged joint,
   (*d*) flux?
   What is the composition of blowpipe solder?
3. Give a sketch of a pressure gauge, showing how you would use it to test a carcass for soundness.
4. (*a*) Describe briefly how you would fix a small tank to a brick wall, 6 ft. up from the floor.
   (*b*) If the tank measured 18 in. by 9 in. by 12 in. high, what would be the weight of the water required to fill it?
5. What should be the approximate hourly gas rate in B.Th.U. of (*a*) a domestic iron, (*b*) a 5-light medium cluster lamp, (*c*) a 4-in. diameter boiling ring, and (*d*) the oven of a medium-size cooker? Assume that each appliance is full on.
6. Give two sketches of a small domestic size meter with all its connections, (*a*) with the service and outlet pipes horizontal, with a slight fall to the meter, and (*b*) where the service and supply pipes are both vertical.
7. Name the various parts of a modern gas fire and state briefly the use of each part.
8. Describe the method that you would adopt when fixing a large inverted burner to a fitting. Name the various parts of the burner, and say how you would adjust it before leaving.
9. What do you understand by a baffler? Give two examples of bafflers, showing how they should be fitted.

Grade II.—Written Paper.

Monday, April 30, 7 *to* 10 *p.m.*

(Not more than six questions to be attempted. The maximum number of marks obtainable is the same for each question.)

1. Describe a method of testing a house carcass for soundness (other than with the use of a pressure gauge), assuming that gas is not available. In the event of the carcass being unsound, what steps would you take to allocate the fault?
2. What sizes of service, meter, and outlet pipe, would be required to serve an appliance consuming 100 c.ft. per hour? Assuming that the total distance from main to appliance does not exceed 80 ft., what loss of pressure would you expect between the main and the appliance when in full use?
3. Why are governors used? Describe the circumstances in which you would use one. Give an outline sketch of any type of governor and explain how it operates.
4. Why is lead pipe usually employed for fixing small meters? Describe an alternative method and discuss its advantages and disadvantages as compared with the use of lead pipe.
5. You are sent to attend to a complaint. A cooking stove is giving trouble, and upon investigation you find that the oven burners smother. What may be the cause, and how would you remedy the trouble?
6. You are instructed to test an installation to 2-lb. per sq. in. pressure. The only gauge available is a 6 in. U type, but mercury can be obtained. Sketch the gauge full scale and show the levels of the mercury at the above pressure.
7. Give a sketch of a complete coke-heated cylinder type hot water circulation system. Show how you would fit a gas water heater to act in conjunction with this system, and how the size of the hot water storage could be reduced as required.
8. Describe briefly how you would carry out the following jobs and make good. In each case give a list of the tools and material required.
   (*a*) Take up iron tongued floor boards,
   (*b*) replace a floor board when it had been necessary to cut it at a place where the joist ceased to support it,
   (*c*) cut a hole through a 9 in. brick wall,
   (*d*) cut a hole through a lath and plaster wall,
   (*e*) fix a pipe clip on the web of a rolled steel joist.
9. How many therms would be required to heat a tank full of water, measuring 4 ft. by 3 ft. by 2 ft., from 40° F. to 200° F. with an appliance having an efficiency of 70%?

Grade II.—Practical Examination.

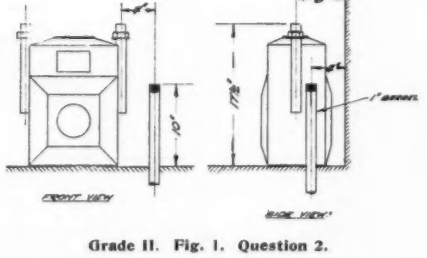
Saturday, April 28.

(Four hours allowed for this paper. Candidates must attempt all questions.)

The following materials to be supplied to each candidate:

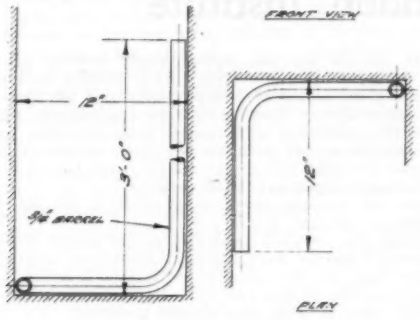
One 2-ft. length of 1-in. lead pipe (gas weight); one 10-light meter cap and lining; one 1-in. lead to barrel union; one 6-ft. length of ¾-in. wrought iron or mild steel barrel (water weight); one 2-ft. length of ¼-in. wrought iron or mild steel barrel.

1. Explain to the examiner the working of the valve handed to you and the purpose for which it is used. (¼ *hour: 20 marks.*)
2. With the material provided make up a 1-in. diameter meter connection to the dimensions shown in fig. 1. Springs and bobbins may not be used. (1½ *hours: 75 marks.*)



Grade II. Fig. 1. Question 2.

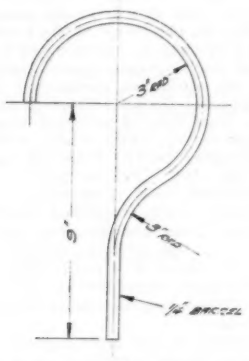
3. With the ¾-in. barrel provided make sets to the dimensions



Grade II. Fig. 2. Question 3.

as given in fig. 2. (*1¾ hours: 75 marks.*)

4. With the material provided bend the ¼-in. barrel to the



Grade II. Fig. 3. Question 4.

dimensions shown in fig. 3. (*½ hour: 30 marks.*)

FINAL EXAMINATION.—WRITTEN PAPER.

Monday, April 30, 7 to 10 p.m.

(*Not more than six questions to be attempted. The maximum number of marks obtainable is the same for each question.*)

1. Describe briefly three systems of distant control for gas lighting. Make a sketch showing the layout of any one of the systems that you describe.

2. A consumer complains of a bad supply and upon investigation you find that oscillation is taking place. To what causes may this be due and what steps would you take to remedy the trouble?

3. In modern buildings concealed gas fire supplies are recommended. Make a sketch showing a plan and an elevation of the hearth, the position of the concealed supply, and the method of connecting it to an existing gas point under the floor. Also show what provision you would leave for a poker burner, in case the incoming tenant decided to use solid fuel instead of a gas fire.

4. Owing to space being limited, it is found necessary to fix two meters to supply 3,000 c.ft. of gas hourly instead of one larger meter. They will both be supplied from the same service and connected to the same outlet. Show, by means of a sketch, all the pipe work for such a job, making provision for a by-pass, and give the pipe sizes.

5. Fig. 1 on the attached plate gives the ground and first floor plans of a small modern house. You are to provide for a gas fire point in each room and for a cooker, copper, multi-point water heater, and a gas iron in the scullery.

Indicate on the sketch the pipe runs and write down in your answer book a list of the materials required for the job. Give the size of meter and service required. Estimate the time it would take a fitter and a fitter's mate to carry out the whole job apart from the service laying.

The height of the rooms on the ground and first floors may be taken as 8 ft. 6 in.

Detach the plate and affix by the gummed edge to a place in your answer book.

6. Describe how you would carry out the following operations, and give a list of the tools and materials required in each case:

(*a*) to cut a 1-in. hole through the web of a rolled steel joist,

(*b*) to make a hole to take a 1-in. connection in an existing water tank,

(*c*) to insert a tee piece on a 2-in. supply pipe buried under a concrete floor.

7. Explain the purposes for which the following may be used and describe fully the operation of *one* of them:

(*a*) a remote control type thermostat,

(*b*) a clock controller.

8. Give a simple outline sketch of a complete coke water heater installation supplying a bath, lavatory basin, and kitchen sink. Show all pipe sizes and the capacity of the hot storage tank. Indicate how you would fix a gas multi-point instantaneous water heater to the installation for use in the summer months.

9. Calculate the total weight, when filled with water, of a cylinder measuring 4 ft. high by 2 ft. diameter outside, constructed of ⅛-in. plate. Ignore the weight of the rivets and overlaps, and assume that the ends are flat. The ⅛-in. plate to be taken as 5½-lb. per sq. ft.

FINAL EXAMINATION.

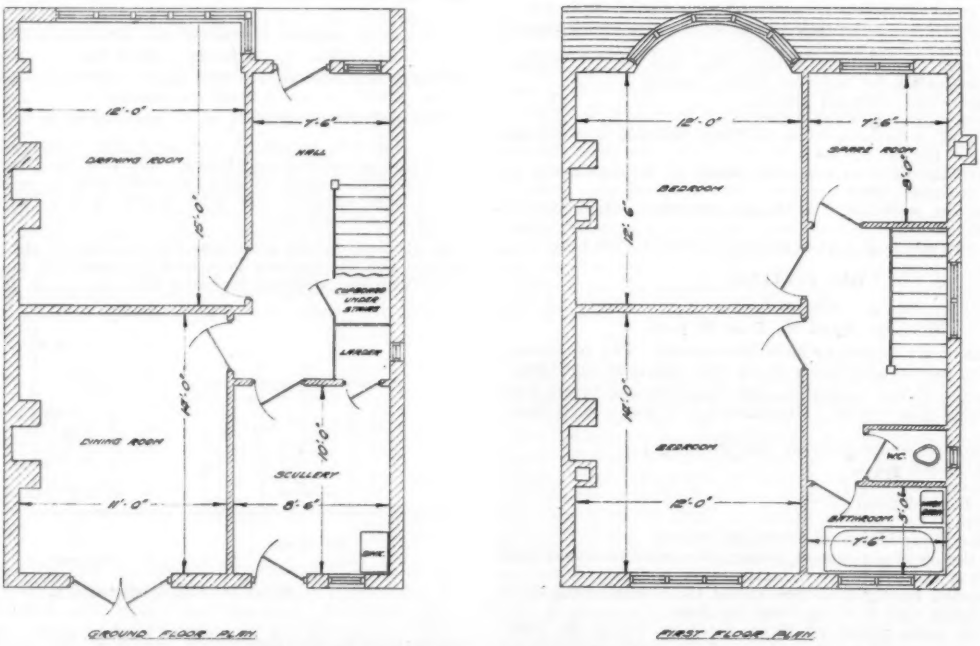
PRACTICAL TESTS.

Saturday, April 21.

(*Four hours allowed for this paper. Candidates must attempt all questions.*)

The following materials to be supplied to each candidate:

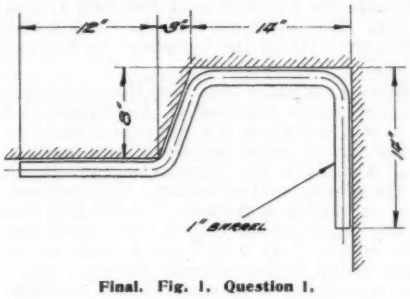
One 6-ft. length of 1-in. wrought iron or mild steel tubing (water weight); one 3-ft. length of 1¼-in. lead pipe (gas weight); 6 in. of ¾-in. lead pipe; one 1¼-in. brass union (lead to barrel); one 20-light meter cap and lining; one



FINAL GRADE WRITTEN PAPER. FIG. 1. QUESTION 5.

3-ft. length of ½-in. annealed brass or copper tubing (18 gauge); one ½-in. union cock; one ½-in. brass union; one ½-in. stub nipple.

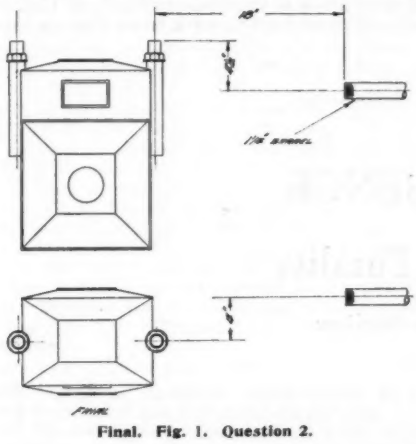
1. With the material provided make a 1-in. set to the dimen-



Final. Fig. 1. Question 1.

sions given in fig. 1. (*1½ hours: 75 marks.*)

2. With the material provided make up a meter connection



Final. Fig. 1. Question 2.

as shown in fig. 2 and make a saddle joint in any position. (*1½ hours: 75 marks.*)

3. Make the gas connection to the sink water heater with the material provided, and explain its operation to the Examiner. (*1 hour: 50 marks.*)

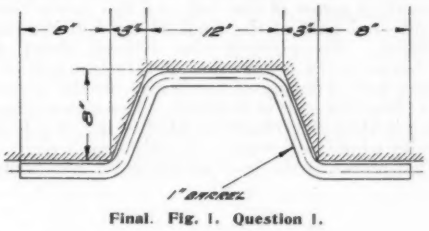
FINAL EXAMINATION.
PRACTICAL TESTS.
Saturday, April 28.

(*Four hours allowed for this paper. Candidates must attempt all questions.*)

The following materials to be supplied to each candidate:

One 5-ft. length of 1-in. wrought iron or mild steel tubing (water weight); one 2-ft. 6-in. length of 1¼-in. lead pipe (gas weight); 6 in. of ¾-in. lead pipe; one 3-ft. length of ½-in. annealed brass or copper tubing (18 gauge); one 1¼-in. lead to barrel brass union; one 20-light meter cap and lining; one ¼-in. stub nipple; one ½-in. union cock; one ½-in. brass union.

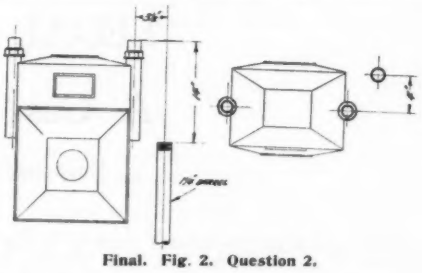
1. With the material provided make a 1-in. set to the dimen-



Final. Fig. 1. Question 1.

sions given in fig. 1. (*1½ hours: 75 marks.*)

2. With the material provided make up a meter connection



Final. Fig. 2. Question 2.

as shown in fig. 2 and make a saddle joint in any position. (*1½ hours: 75 marks.*)

3. Make the gas connection to the sink water heater with the material provided, and explain its operation to the Examiner. (*1 hour: 50 marks.*)

Gasholder Repair While in Action

Development of the Welding Process

By BASIL HEASTIE, M.Inst.C.E., M.Inst.Chem.E.

More and more is being heard about the successful application of welding to engineering work generally, and lately its special adoption for gas-works plant construction and repair has received frequent mention in the "JOURNAL." There is, in fact, every indication that welding will replace riveting in quite a number of structures. The welded gasholder is not, of course, by any means new, though it has gained little favour in this country. As long ago as 1923 and again in 1926 Mr. J. N. Reeson gave an account in the "JOURNAL" of gasholder construction and repair by welding at the works of the Metropolitan Gas Company of Melbourne, and left his readers in no doubt as to his views on the subject.

The advantages of being able to repair holders while they are actually in commission are very great indeed, and with electric welding repairs can be carried out without interfering with supply to the district. Moreover, this repair work can, it is claimed, be undertaken with the assurance of perfect safety. It is now possible not only to provide a new ring of plates by welding, but an entirely new bell. Leaking rivets can be welded by over-bridging and made gas-tight again—and this whether the corroded portion is above or below the water line. The writer is informed that over 200 holders up to a capacity of 3,500,000 c.ft. have been repaired by electric welding by a method employed by Messrs. Wegner, of Berlin.

By their method, new plates to replace defective ones are packed with a material such as asbestos cord before being pressed into position against the holder. After this, welding to the original plating is carried out in the normal way. If the new plates are required to cover rows of rivets in the original plating, then they are formed with suitable cavities to fit over the rivets. The idea is best explained

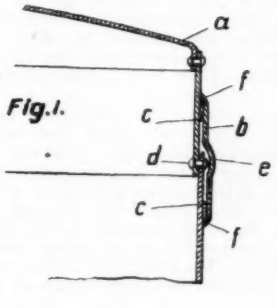


Fig. 1.

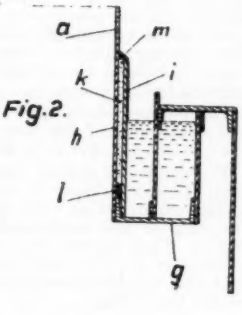


Fig. 2.

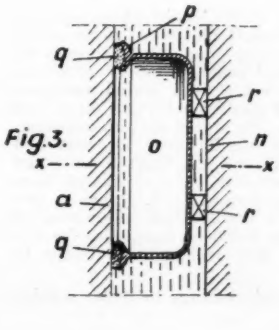


Fig. 3.

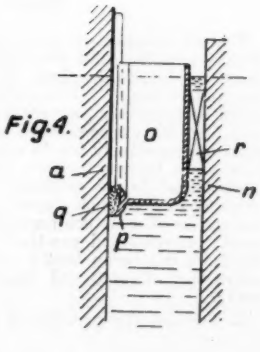


Fig. 4.

by reference to fig. 1. In this the plates *b*, which are to cover the defective plates, are laid on the outside of the holder *a*. The asbestos cord packing is shown at *c*. To enable them to cover the rivets *d*, recesses *e* are provided. The welding is shown at *f*.

The foregoing simple method is not, of course, applicable to the welding of new plates below the water level. Where the affected plates lie at the level of the water seal in the cup of a telescopic holder there is insufficient working space for the welder. To overcome the difficulty a cylindrical sheet metal ring, which surrounds the entire periphery of the bell, has its vertical seams welded above the water seal so that a space of 1 to 2 cm. is left between it and the affected outer shell of the bell. When the vertical seams are completed the cylindrical ring is lowered into the annular sealing space of the bell and the space between it and the affected part of the shell of the bell is rammed in with cement. To prevent the cement from running through between the lower edge of the ring and the lower edge of the seal, a luting of tar is put on the underside of the seal before the ring is inserted. The upper edge of the metal ring is then electrically welded to the old shell of the bell over its whole periphery. In this way a tight joint of the affected plates at the level of the water seal is obtained.

Fig. 2 will help to make the method quite clear. In this diagram *a* denotes the holder, over the affected plates *h* of which lying at the level of the water seal *g* the sheet metal ring *i* is applied. The layer of cement *k* is introduced between the plates *h* and the ring *i*, and *l* is the luting of tar. The upper part of the sheet metal ring *i* is then welded over its entire periphery to the plates *h* by the seam *m*.

When there is sufficient space for the operator, the work may be carried out in the case of plates lying in the water by using a box by which the affected plates are isolated clear of the water until the work has been completed. Figs. 3 and 4 explain the procedure. In both diagrams *a* indicates the plating of the holder. The box *o* is lowered into the water, and is so formed that the face towards *a* is absent. The edges which bound the lateral opening are recessed as indicated at *p* and are packed to exclude the surrounding water by introducing between the edges and the wall *a* a packing *q* of some elastic material—*e.g.*, a rubber tube inflated with compressed air, or a strip of solid rubber. The packing is compressed by supporting the box against the wall *n*—say, by wedges *r*. The water contained in the box is then pumped out, so that a portion of the wall sufficient for the work to be done is exposed.

LEGAL INTELLIGENCE

A Gas Poisoning Fatality

Responsibility for Defective Services

Lord CARMONT and a jury concluded recently in the Scottish Courts the trial of an action by Mrs. Lily Mitchell or Miller, of Coatbridge, on her behalf and on behalf of her daughter Marion, aged eight years, against Robert Addie & Sons' Collieries, Ltd., Rosehall Colliery, Coatbridge, for damages in respect of the death of the husband and father, and injuries sustained by Mrs. Miller and her daughter. Mrs. Miller sued for £1,100 on her own behalf and for £850 on behalf of her daughter.

The pursuer stated that she and her husband and their daughter occupied a single apartment dwelling-house at 140, Whifflet Street, of which the defenders are proprietors. On the night of December 9-10 while the three were in bed asleep they were seriously injured by coal gas poisoning. The poisoning was caused by an escape of gas from a service pipe by which gas was led from the gas mains in the street to the dwelling-houses 128 and 130, Whifflet Street, which were part of a row of houses belonging to the defenders.

On the forenoon of Dec. 10 neighbours discovered them lying in bed unconscious. There was a strong smell of gas in the house. All the gas taps in the house, including the meter, were found to be turned off. Mr. Miller died on Dec. 16. The pursuer and her daughter remained unconscious until Dec. 11 and were discharged three days later. Their health was seriously affected by the poisoning.

The pursuer stated that the gas escape was due to the fault and negligence of the defender. The service pipe from which the gas escaped was in a defective and dangerous condition.

The defenders denied fault. They stated that assuming that they had any liability in respect of the upkeep and repair of the service pipes, which they denied, these pipes were adequate for the purpose and conformed to the usual standard in use elsewhere. They denied that the pipe leading to the house was in a defective or dangerous condition. They believed and averred that the accident must have occurred from an escape of gas within the house.

EXPERT EVIDENCE.

Expert evidence was given by Mr. *J. W. Napier* (Engineer and Manager to the Alloa Corporation Gas Department) to the effect that, as regards the duty of inspection of gas service pipes by gas undertakings, his experience and practice had never recognized as necessary any regular system of time period examination. In his experience escapes of gas from service pipes had been comparatively few in number. He stated that on examination pipes known to have been in use for over 50 years had been found to be perfectly sound and gas-tight even when covered with a thick deposit of corroded material arising from the action of moisture and substances in the soil. Pipes in this condition remained gas-tight if left undisturbed. Corrosion of itself did not mean that a pipe was holed or dangerous for the conveying of gas, and therefore that leakage was likely to occur.

It was not the practice of gas undertakings to make regular inspection of service pipes. Renewals of service pipes to a large extent were regularly carried out because of the need of laying larger pipes to meet the increased demand for gas for domestic purposes, also because of alterations and improvements of roadways, and as a result of deposits inside the pipes.

A gas undertaking in his opinion could not be expected to carry out constant inspection of all its pipes. Negligence could only be proved when some circumstances arose such as an escape of gas, and the gas supply undertaking should have had notice which would have demanded examination of pipes.

Mr. Napier quoted from the "Report to the Board of Trade of the Departmental Committee on Deaths from Gas Poisoning —January, 1930," which stated that out of 1,026 fatalities in England and Wales attributed to accidental gas poisoning, and which were examined by the Board of Trade, 68 were due to escapes from main and service pipes, and that they arose from 36 escapes only. In the conclusions reached by the Committee as to the contributory causes of accidents, service pipes were not mentioned. The Committee, in their Recommendations stating the precautions to be taken, made no reference to the need of inspection of service pipes.

Mr. *H. G. Ritchie* (Engineer and Manager to the Falkirk Corporation Gas Department) corroborated, and stated that the number of escapes of gas from service pipes were very few indeed, and that he had never considered it necessary to carry out a regular inspection of service pipes.

VERDICT FOR PURSUER.

Lord CARMONT, in the course of his Address to the jury, said. I am going to charge you, and I am taking the responsibility in this, that unless there is proof of complaint that satisfies you that complaints were made to the defenders, there is no fault on the part of the defenders in regard to this matter. They are not bound to go pulling up the gas pipes to see whether there are or are not escapes possible—to see how the pipes are getting on, as it were—and it would be an impossibly hard burden to put upon the defenders or a gas company to say that they had got to inspect, unless there is something in the way of warning addressed to them or knowledge brought home to them that something is wrong, unless they knew that the character of the soil in which the pipes were placed, let us say, was specially bad. Unless they knew there was some special tendency for the pipes to go wrong that is not to be considered against the defenders, but if complaints have been made that put the defenders on their guard, or should put them on their guard, that something is wrong, and those complaints are neglected, then you have sufficient to justify you in holding that the defenders were in fault and neglected their duty of looking after the system for which, it is admitted on both sides, they are responsible.

The jury returned a unanimous verdict for the pursuer and awarded her £600 on her own behalf and £200 on behalf of her daughter—in all £800.

Gas Boilers for Public Baths*

By J. T. Grundy, M.N.A.B.S., A.S.A., R.L.S.S., Superintendent, Baths Department, Burnley.

This paper has not been prepared with a view to advocating the installation of gas-fired boilers in all circumstances, but rather as a record of the experiences during the installation and subsequent working of such boilers at the Central Baths at Burnley.

The Central Baths were opened on July 6, 1887, and consist of two plunge baths measuring 54 ft. by 21 ft. by 6½ ft. and 3½ ft., and 63 ft. by 24 ft. by 6½ ft. and 3½ ft. respectively, 13 first-class slipper baths, 13 second-class slipper baths, and 3 vapour baths for males; also 8 slipper baths and 1 vapour bath for females.

The boiler house is in the basement under the centre of the building, and the two original boilers were condemned by the insurance company in 1931. These were Cornish boilers 20 ft. by 6 ft. diameter, and had nests of 2 in. copper pipes inside, through which the water for the plunge baths was circulated to a large tank (15 ft. by 7 ft. by 5 ft.) when refilling the baths, thus acting as a calorifier. It was impossible to take out the boilers whole, or to replace them with the same type, without a large amount of structural alteration.

There was no filtration plant installed, the baths being emptied and filled three times each week. The Baths Committee decided to install filtration, and after receiving a report from the Borough Engineer, also decided to install two 6 B-type Bonecourt town gas-fired boilers. These boilers are 6½ ft. by 4½ ft. diameter, equipped with automatic gas control worked by the steam pressures, and automatic electric boiler feed pumps. As a large hole was formed in the outer wall of the basement to enable the filters to be installed, it was possible to bring in the boilers, and place them in the boiler house, after the old Cornish boilers had been cut into pieces by an oxy-acetylene flame, and removed.

Various alternatives were considered, and while oil-fired boilers could have been adopted at approximately the same cost, it was felt that, as the price of gas was very reasonable, and it was manufactured by the Corporation, any profit on the sale of the fuel would be kept within the Corporation, while with oil fuel it would go out of the country.

The boilers supply the whole of the steam required for the heating of the plunges and buildings and for the hot water supply, the hot water for the slipper baths and spray baths being supplied from calorifiers and storage cylinders. The filtration plant is electrically driven.

The calculations upon which the steam consumption and running costs were based are as follows:

PLUNGE BATHS.

Ladies' plunge bath contains . . . . . 30,000 galls.
Gents' ,, ,, ,, ... 39,000 ,,
69,000 ,,

(1) Heat required to warm up the water:
Required temperature of the water . . . 78° F.
Temperature of the cold water. . . . . 45° ,,
Temperature difference . . . . . 33° ,,

Ladies' plunge bath:
Volume of water . . . . . 30,000 galls.
Weight of water . . . . . 300,000 lbs.
Temperature difference . . . . . 33° F.
∴ B.Th.U. required = 300,000 × 33 . . = 9,900,000 B.Th.U.
Amount of heat lost during the warming-up period (12 hours):
75,000 × 12 (obtained from 2 below) . . = 900,000 ,,
10,800,000 ,,

Gents' plunge bath:
Volume of water . . . . . 39,000 galls.
Weight of water . . . . . 390,000 lbs.
Temperature difference . . . . . 33° F.
∴ B.Th.U. required = 390,000 × 33 . . = 12,870,000 B.Th.U.
Amount of heat lost during the warming-up period (12 hours):
∴ 97,500 × 12 (obtained from 2) . . . . = 1,170,000 ,,
Total . . . . . = 14,040,000 ,,

Approximately 10,000 gallons of make-up water per week are added to the baths to replace water used for washing the filters. The average temperature can be taken at 50° F., and as the baths are closed one week for cleaning and one week for the local holidays,

∴ 10,000 × 10 × 28 × 50 = 140,000,000 B.Th.U.

(2) Heat required to maintain the temperature of the plunge water:
The water in each plunge will be circulated once in ever four hours.
The difference in temperature between inlet and outlet to bath = 1° F.

Ladies' plunge bath:
Amount of water . . . $\frac{30,000 \times 10}{4}$ = 75,000 lbs.
Temperature difference . 1° F.
∴ B.Th.U. per hour . . 75,000 × 1 = 75,000 B.Th.U.
B.Th U. per day . . . 75,000 × 24 = 1,800,000 ,,
Bath is open all year, days 365
∴ B.Th.U. for the year . 1,800,000 × 365 = 657,000,000 ,,

Gents' plunge bath:
Amount of water . . . $\frac{39,000 \times 10}{4}$ = 97,500 lbs.
Temperature difference . 1° F.
∴ B.Th.U. per hour . . 97 500 × 1 = 97,500 B.Th.U.
B.Th.U. per day . . . 97,500 × 24 = 2,340,000 ,,
Bath is open all year, days 365
∴ B.Th.U. for the year . 2,340,000 × 365 = 854,100,000 ,,

SLIPPER BATHS.

Number of bathers for 1930-1931:
Gents' 1st class slipper baths 9,944
Gents' 2nd class slipper baths 3,907
Ladies' slipper baths 5,600
Vapour baths 498
19,949
School children. 25,832

Heat required for slipper baths for one year:
Number of baths, say, 20,000.
Assuming each bath requires 20 gallons of water at 165° F. ∴ 20,000 would require 400,000 gallons.
B.Th.U. required to heat the above amount of water from 50° F. to 165° F. = 400,000 × 10 × (165°-50°) = 460,000,000 B.Th.U.

Heat required for vapour baths:
The slipper baths attached to the vapour baths are taken in with the slipper baths:
Number of vapour baths, say, 500.
Assuming each bath requires ½ lb. of steam.
Amount of steam used = 500 × ½ = 250 lbs. of steam.
B.Th.U. required = 250 × 1,000 = 250,000 B.Th.U.

Heat required for School Children's Showers:
Number of bathers, 26,000.
Assuming each shower requires ½ gallon of water at 165° F.
∴ 26,000 showers require 13,000 gallons.
B.Th.U. required, 13,000 × 10 × 115 = 14,950,000 B.Th.U.

Slipper Baths:
Heat lost by hot water storage cylinder.
Copper cylinder 4 ft. dia. × 10 ft. long, contains 750 gallons.
Super area of cylinder, 150 sq. ft.
Cylinder is covered with a 2 in. coat of Compo insulation.
The conductivity of the insulated cylinder = 0·25 B.Th.U. per sq. ft. per 1° F.
Temperature of water in cylinder . . . . . 165° F.
Temperature of outer air, say . . . . . 65° ,,
100° ,,

∴ Heat loss from cylinder:
Area of cylinder = 150 sq. ft.; conductivity = 0·25 B.Th.U. per sq. ft. per 1° F.

Temperature difference . 100° F.
B.Th.U. loss per hour . 150 × ·25 × 100 = 3,750
B.Th.U. loss per day . 3,750 × 24 = 90,000
B.Th.U. loss per year . 90,000 × 360 = 32,400,000

Heat required for warming the building:
Temperature: Outside taken at 43° F. (average October-March)
,, Inside taken at 70° F. (,, ,,)

Heat Losses per Hour.	B.Th.U.
1st class slipper and waiting-rooms	44,886
Ladies' plunge bath	34,143
Office	13,317
2nd class slippers and waiting-room	43,934
Ladies' slipper baths	24,394
Gents' plunge bath	50,000
Children's shower room	28,393
Total	239,067

* Paper at the 1934 Conference of the National Association of Bath Superintendents (Incorporated).

The buildings are heated for a period of 26 weeks, and will lose heat during the whole of this period.

Heat loss per hour . . . 239,067 B.Th.U.
Total heat loss per season . 239,067 × 24 ×7 × 26 = 1,044,244,656

SUMMARY.

	B.Th.U.
Heat required from all sources per year:	
Warming up plunges—	
Ladies' plunge	10,800,000
Gents' plunge	14,040,000
Replacement of wash water	140,000,000
Maintenance of plunges—	
Ladies' plunge	657,000,000
Gents' plunge	854,100,000
Wash baths—	
Slippers	460,000,000
Vapours	250,000
School children	14,950,000
Maintaining heat in hot water cylinder	32,400,000
Heating of building	1,044,244,656
	3,227,784,656

Say, 3,227,784,656 B.Th.U.
Gas costs per annum:
Total B.Th.U. required per annum, 3,227,784,656 B.Th.U.
Gas at 500 B.Th.U. per c ft.
70% efficiency = 350 B.Th.U. per c.ft.
1s. 0½d. per 1,000 c.ft.

$$\text{Cost} = \frac{3,227,784,656}{350 \times 1,000} \times \frac{25}{24} = 9,606{\cdot}5 \text{ shillings} = £480\ 6s.\ 6d.$$

The boilers were put into commission on May 12, 1932, and during the first week the consumption was 333,700 c.ft. This included the first heating up of the two plunges to 78° F., the heating of the building to 72° F., and the heating of the 750 gallons storage cylinder for the slipper baths.

For the following week the consumption was 233,300 c.ft. During the next six weeks (until the baths closed for the annual holidays, July 8 to 15) the average weekly consumption was 172,233 c.ft.

For the week ended July 22, the consumption was 194,200 c.ft., and for the week ended July 29, 158,560.

During August the weekly consumption was 144,125 c.ft., during September it was 154,504, October 191,532, November 214,275, December 201,680.

The total gas consumption for one year's working was 8,659,000 c.ft., and the cost was £451.

Due to the installation of the automatic gas-fired boilers, we have saved per annum £48 labour charges, £4 10s. on the removal of ashes, and £3 for the cleaning of the flues. Previous to the alterations, our coal costs for this establishment were about £400 per annum. The buildings and cellars are now much cleaner, and the attendants can be suitably attired at all times for their duties of attending on bathers. A long standing complaint of black smoke from the baths chimney has been overcome, and a lead has been given to other users of steam boilers in smoke abatement.

BOILER DETAILS.

Length of boiler over-all	6½ ft.
Length of actual boiler inside	4 ft. 4 in.
Diameter of boiler inside	4 ft.
Length of gas waste chamber	2 ft. 2 in.
Diameter of gas waste chamber	4 ft.
Thickness of boiler plate	⅜ in.
Number of fire tubes	80
Height of working level of water above top tubes	6 in.
Outside diameter of tubes	2 in.
Inside diameter of tubes	1⅞ in.
Thickness of tubes	⅛ in.
Number of gas jets	80

Three rows of jets can be shut off on each side of the centre of the boiler; therefeore each boiler can be worked on the following number of jets, 80, 72, 64, 56, 48, 40, 32.

Imperial Continental Gas Association

ANNUAL MEETING

The One Hundred and Eighty-Sixth Ordinary General Meeting of the Imperial Continental Gas Association was held in the Cambridge Room, Great Eastern Hotel, Bishopsgate, London, E.C., on Friday, June 1, 1934, at 2.15 p.m., Sir THOMAS ROYDEN, Bt., C.H. (Chairman of the Association), presiding.

The SECRETARY (Mr. W. E. Bowers) read the notice convening the meeting, and the Auditors' Certificate to the Balance Sheet.

REPORT AND ACCOUNTS.

The CHAIRMAN: The Report of the Directors, and the Accounts, have been printed and have been in the hands of the proprietors for some days. Therefore, I propose that they be taken as read.

(This was agreed to.)

The CHAIRMAN said:

My Lords, Ladies and Gentlemen,—

I must first apologise for the absence to-day of our Deputy-Chairman, Sir Henry Birchenough, who is on a visit to Rhodesia. Since our last Annual Meeting he has retired from the position of Chairman, a position he held for 2½ years. Increasing demands from other quarters on his time and thoughts made it imperative for him to seek some relief from the load of responsibilities that he was carrying, and under the circumstances, we, his colleagues, felt that we could not resist his request that he be allowed to give up the Chairmanship. I am happy to be able to add that Sir Henry is retaining his seat on the Board, of which he has been a member for 35 years. It may be of interest if I read a cable sent by Sir Henry from Cape Town. In it he says: "Best wishes for general meeting. Congratulate you and the shareholders on the result of the year's work. You will no doubt apologize for my absence."

Before dealing with the Accounts in detail, I should like to preface my remarks by giving you in very general terms the lines of policy which we are endeavouring to follow. Until comparatively recent years, this Association exploited its gas and electricity concessions as British undertakings in the different countries in which we were operating. That policy has now been changed and most of our interests have been converted into local companies, thereby assuming the nationality of the country in which they are situated.

I feel sure that you will approve our standpoint and the steps which we are taking to build up a national individuality for each of our undertakings. Capital is international, but as far as possible a national of any particular country should have the possibility of participating in the enterprises of his own country, and with this object in view we are working steadily towards the creation of an identity of interest between our consumers and the shareholders of our individual enterprises. The process is slow, but over the course of the year various measures have been taken, all leading in this direction.

International holdings, such as this Association represents, are one of the best assurances for peace, and I should regret, on political as well as on commercial grounds, to see any diminution in this Association's position in the field of foreign public utilities, in which it has been active for well over a century. We are specialists in the management of such undertakings, and are often enabled, as the result of our diverse interests, to use the experience gained in one country to the benefit of another. I am not therefore seeking to justify our policy, which I feel sure will commend itself to you, but I desire to emphasize that in my opinion it is reasonable and right that we should allow the natural desires of the Municipalities, whom we serve, and of the investing public of those countries in which we are operating, to find expression both in an increasing measure of control and also of financial participation in our undertakings.

We are fully alive to the necessity of protecting your interests, but by progressing along the path I have indicated, which is the path of common sense, we are best discharging our trust. I should like at this point to pay a tribute to the great assistance we receive in this matter from our eminent colleague, Monsieur Theunis, and from the new French President of the Compagnie Continentale du Gaz, in France, Monsieur Félix Vernes.

I will now ask you to turn to the Accounts, beginning with the Credit, the right-hand, side of the Balance Sheet.

The first item, Works and Mains, shows a reduction of £320,000. This reduction is principally due to the fact that we have sold to our Belgian Subsidiaries, against shares or cash, certain properties which were previously included in our Balance Sheet under this heading.

From time to time also, as opportunity offers, we sell the freehold sites which it has not been deemed advisable to transfer to the Subsidiary Companies and which are no longer necessary for the conduct of our business. There is, however, very little demand at the present moment in Belgium for commercial sites, and in consequence the process of realization is slow.

Investments in our Associated Companies show, on balance, an increase of £275,000 compared with a year ago. This increase is attributable to various factors, such as the allotment of additional shares against properties which we have ceded.

During the course of the year we have also made certain new investments, which we are satisfied are likely to prove remunerative to the Association. Details of these are given in our Annual Report from time to time.

On the other hand, some of our investments have been realized. Of these the chief transaction has been the sale of our holding in the Berlin Electricity Company. Your Board felt that the position in Germany was such as to make the retention of this investment inadvisable, and we therefore took advantage of an opportunity to realize on terms which left a sterling capital profit upon the amount we paid for it, and, in addition, I would remind you that during the period when this investment was held, a return of from 9% to 12% per annum upon original cost was received by the Association by way of divi-

dend. We may, I think, congratulate ourselves upon the step which we took, as to-day it would only be possible to realize—if indeed it were possible to realize at all—at a figure which would leave, not only no capital profit, but a considerable loss.

You will see among our new investments the name of Contibel. Contibel is a Belgian Holding Company which we have created and to which we are gradually transferring our investments in the Belgian operating companies where we enjoy a majority position. Just as most of our interests in France are concentrated in the Compagnie Continentale du Gaz, so in the course of time the larger part of our Belgian holdings will be concentrated in the hands of Contibel. The result of this step will be considerably to simplify the task of administration and accountancy.

During the year under review, the Compagnie Continentale du Gaz, in France, has repaid out of its liquid resources part of its subscribed capital. The sum which the Association received in this way was £270,000. This, together with the proceeds of the sales of our holding in the Berlin Electricity Company and other holdings, amounting in total to £860,000, is reflected in the increase of our British Government Securities and Cash, which relatively to last year show an increase of £769,000. The balance unaccounted for of approximately £91,000, represents further advances to our Associated Companies. This sum, as also the amounts which these Companies have themselves appropriated to reserve, was required to enable them to finance their programmes of extension and for other purposes. In the case of the Cokeries du Brabant, an advance had to be made to fill the gap which exists between its receipts and its expenditure. Part of this gap is due to trading losses, and part to further expenditure on capital account which was incurred in order to improve the installations of that undertaking, expenditure which receives the most careful attention of your Board. No expense is sanctioned which is not likely to be immediately remunerative.

This undertaking, the Cokeries du Brabant, has passed through an extremely difficult period. Its costs are gold costs, whereas a large part of its receipts are in sterling, and, in consequence, the more the franc appreciates in value relatively to sterling, the more difficult is the task of carrying on the business profitably. No effort is being spared to cut down costs, and every opportunity is taken to improve the prices which we obtain for our products, but I am afraid that there is a long and difficult road ahead of us before this Company is likely to find itself on a dividend-paying basis. You must forgive me for taking up an undue proportion of your time in talking about this particular subject, but in the Imperial Continental Gas Association we are not accustomed to having companies operating at a loss, and therefore the problem which this Company presents assumes perhaps an unduly large importance in our eyes. The magnitude of the task which confronts us can be assessed from the fact that the coal which we carbonize is costing to-day 107% of its pre-war gold price, whereas the products of carbonization are realizing only 43·22% of their pre-war gold value. The chief product is, of course, metallurgical coke, and any recovery in the heavy industries is bound to exercise an immediate effect upon the fortunes of this undertaking. Such a recovery is already taking place in this country, but the recovery is local in its influence, and Belgium, being mainly dependent upon export trade, is not likely to be able to redress the adverse balance between the price of the raw material and the price of the products, unless there is some increase in the volume of world trade in general. I think it desirable to add that, in accordance with our tradition of conservative finance, full provision has been made within the accounts of our Group for the loss of the Cokeries du Brabant, amounting to some seven million francs.

Our Advances to Subsidiary and Allied Companies show a decrease of £702,000. This decrease is principally due to the conversion of a loan of £582,000, which we had made to the Cokeries du Brabant, into an option upon shares of that Company. Apart from that, some of our Subsidiary Companies sold to the Association certain of their investments, and reduced their indebtedness to The Utility Loan Company proportionately.

The Utility Loan Company, as you know, is the finance company through which the Association operates in all such transactions.

We expect that during the current year these Advances will be still further reduced. Our debtors are for the most part, however, the Companies of our own Group, and you will appreciate that it is impossible for them to finance their programmes of extension and at the same time to repay any considerable portion of their indebtedness.

The uncertainty of the position of International Exchanges renders it necessary to keep a careful watch in order to ensure that our Group, which is always a creditor for foreign currency for gas and electricity supplied, owes in its turn fairly substantial currency amounts. In this way we protect to some extent our cash position against the hazards of violent exchange fluctuations.

Before turning to the other side of the Balance Sheet, I may mention that on March 31, the date of our Balance Sheet, the market value of our British Government and other home investments was £120,000 in excess of the figure at which they stand in our accounts.

On the other side of our Account, you will observe that, in contrast with the rather violent movements which have occurred in this item during the last few years, Reserves remain practically unchanged. These Reserves are held to cover depreciation, if any, in our Works and Mains, or in our Investments. Our Investments are conservatively valued, so that actually these Reserves at the moment represent, for a large part, the surplus value of our investments over and above our capital and other liabilities.

If you will now turn to the Profit and Loss Account at the foot of the Balance Sheet, you will see that our total revenue for the year under review amounted to £706,000, as compared with £721,000 in the previous year. This slight decrease need not cause you any anxiety, as our Group of Companies has collectively, during the year under review, placed to depreciation and reserve, over and above the amount required to cover the losses in the Cokeries du Brabant, sums equivalent to £538,000, as against £411,000 in the preceding year, an increase of £127,000.

You will see that our Administration and General Expenses, including Taxation, show a reduction of £17,000. This reduction accrues mainly under the head of income tax, which this year is lower owing to the smaller proportion of our revenue which has undergone deduction of tax at source. We, of course, in common with other companies, have suffered from a reduction in the rate of interest on gilt-edged securities.

Some of you may feel that at an early stage in my speech I struck a somewhat depressing note, but in reality the picture is not by any means an unsatisfactory one. The sales of gas in the companies in which we are interested show an increase of 1·45%, and of electricity of 4%. The countries in which we operate, France, Belgium, Holland, and Czecho-Slovakia, have been passing through a period of severe industrial depression, and it is therefore the more satisfactory that, in contrast with the decreases in gas sales which are the rule in this country, our figures show an actual percentage increase. It is obvious that in a time of industrial depression the consumer has less money to spend, even upon such necessaries as gas, and this increase in our output of gas, for which the demand is mainly domestic, is therefore all the more satisfactory.

Electricity, with an increase of 4%, is not so good, as compared with the increases of 10% to 12% which are quite usual in this country. Our slower rate of development is attributable mainly to a decrease in our sales of high tension current, which, as most of you know, is principally, in fact almost exclusively, utilized by industrial undertakings, such as factories. In high tension current our sales touched their peak in 1929, but since that date there has been a disconcerting slump. Some improvement, owing to increased industrial activity, was registered in the early months of 1933, but that recovery has not been maintained. The question of the prices charged to our customers is constantly under our consideration, and we endeavour in every possible way to meet the requirements of our consumers. I feel convinced that when a real recovery of trade takes place, a substantial increase in our sales will follow.

Those of you who are fully acquainted with the great qualities of the French and Belgian peoples will, I feel, share my opinion that in any world revival of trade France and Belgium will find a worthy place. The tremendous efforts which France, Belgium, Holland, and the other gold countries have made to remain upon the gold standard should undoubtedly in the sphere of economic achievement hold pride of place with the calm and disciplined manner in which England abandoned the gold standard. The process has been hard and painful for them, great sacrifices have been, and are being, demanded from every section of the community, and I feel certain that everyone here will wish the gold countries every success in the endeavour which they are making to safeguard the savings of their people by maintaining their currency intact. The ultimate outcome is difficult to forecast; but, in the event of their efforts not proving successful, my faith in the efforts of these great peoples to make the necessary adjustments in a reasoned and orderly way remains unchanged.

I am sometimes asked what would be the position of a stockholder of this Association in the event of the abandonment of the gold standard by the gold countries. I hope I have sufficiently clearly indicated that, whereas the profits which the Association derives from the sales of gas and electricity are enhanced by the high sterling value of the franc, we are, on the other hand, penalized by poor trade in general; particularly by its effect upon the sales of industrial gas and high tension current and upon an undertaking such as the Cokeries du Brabant.

The districts in which we operate are to a large extent dependent upon export markets, and any fall in the value of the franc would, barring the operation of quotas and tariffs, give a considerable stimulus to trade activity, in which case there should be an increasing demand for our gas and electricity. Let me give you two examples from Belgium. In 1933 the number of days per week of unemployment per insured worker in Belgium was 1·21, which is equivalent to 22% of unemployment, as compared with 1·8%, which was the corresponding figure of unemployment during the period 1923 to 1929. During the year 1933 the gas consumption per consumer showed a reduction of 17·4%, compared with the average consumption during the period 1923 to 1929. During that period I may mention that gas prices fell by 12½%, while electricity prices fell by 20%. These figures serve to demonstrate the very important bearing which employment has upon our output and justify us in concluding that in the event of any revival of trade, at least a part of this lost ground would be made good.

I will now give you the second illustration of the manner in which we might derive compensation from any devaluation of the gold currencies. Transactions for the sale of coke for purposes of export take place mainly in terms of sterling. When the Belgian franc stood at 175 to the £, the export price of coke was 14s., so that a ton of coke realized Frs. 122.50. To-day the export price of coke is 18s., but as the rate of exchange is

about Frs. 110 per £, a ton of coke now realizes only some Frs. 99. That is to say that notwithstanding an increase of 4s. in the export price of coke, we are receiving Frs. 23.50 less per ton of coke exported. As we export against sterling contracts some 260,000 tons of coke a year, this represents a decrease in our receipts of over Frs. 6,100,000 per annum. In addition, the fact must be borne in mind that the sterling export price of coke to a very large extent governs the inland price, so that it would perhaps be not far from the truth to assume that with the franc on its old basis, our coke-oven undertaking would earn some Frs. 14,000,000 extra, always assuming, of course, that the cost of production remains the same.

These figures are to a very large extent conjectural, but my sole object in giving them is to demonstrate that there is a rough side, as well as a smooth side, of the exchange profits which we are making. Obviously in the event of the gold countries deciding upon any measure of devaluation of their currencies, there would be a period of uncertainty and hesitation until our existing franc contracts had expired, but your Board are fully alive to the importance of this and have endeavoured—we hope successfully—by providing forward exchange cover, to protect the interests of the stockholders over this difficult period. It is impossible to make an exact mathematical calculation as to whether an increase in our trading profits would completely compensate for the loss of the exchange profits which we at present enjoy, but I believe that ultimately such would be the case. It is fortunate for us that in a period of bad trade our sterling results are maintained as a consequence of these exchange benefits, but our primary objective is to trade, and I would far rather dispense with such fortuitous profits and be able to feel that any additional benefits we stockholders may receive are due to the sale in increasing quantities of gas and electricity and to an expansion of trade in general, which is the only sure basis of prosperity.

The profit of the year with which we have to deal is £514,269. You will see from the Report that we propose the distribution of a final dividend of 7%, making with the interim dividend of 5%, which was paid in November last, a total dividend for the year of 12%. This dividend absorbs a gross sum of £672,000, or after deduction of income tax, £513,800. This will leave a small balance to be added to our Carry Forward.

Before putting the motion giving effect to our recommendation, it is my pleasure and privilege to pay a tribute to the admirable work of all those who are in the service of our Association here in London and of the Companies abroad with which we are so closely connected. Our Managing Director, Mr. James, is a tower of strength, and his intimate knowledge of both the technical and commercial sides of our business is of the greatest value. He never spares himself in the performance of his functions as our Chief Executive Officer, and as Chairman I can speak with the knowledge that close personal association gives of the enthusiasm and ability he brings to bear in everything he undertakes.

The economic conditions of the past year have made it a difficult and anxious one for all of us. Public Utility Companies have inevitably felt the strain, and the conduct of the business of our operating companies abroad has called for the exercise of unceasing vigilance and tact. To Monsieur Périer and Monsieur de Richemont, to whom, as you know, the executive administration of our companies in Belgium and France is entrusted, is due the greatest credit for the admirable way in which they have carried out their responsibilities.

The same spirit animates the Staff throughout; and the loyalty and spirit of partnership and team work that are so conspicuous a feature among all ranks are assets of incalculable value in a business like ours that is so widespread and includes so many different nationalities.

I know that it will be your wish that I convey to all concerned an expression of very cordial appreciation of, and sincere thanks for, their efficient, loyal, and ungrudging services during the past year, and a message of goodwill at all times from you to them. (Applause.)

I now move that the Report of the Directors and the Audited Statement of Accounts for the twelve months ended March 31, 1934, already printed and circulated amongst the Proprietors, and now read, be adopted, and that a Final Ordinary Dividend on the £5,600,000 Capital Stock be paid on June 2, 1934, for the year ended March 31, 1934, to Proprietors registered in the Books at the close of business on May 16, 1934, at the rate of 7% (actual), less income tax at 4s. 6d. in the £, making, with the Interim Dividend of 5% (actual), less income tax, paid on Nov. 17, 1933, a Dividend at the rate of 12%, less tax, for the year.

The Rt. Hon. Sir GUY D. A. FLEETWOOD WILSON, G.C.I.E., K.C.B., K.C.M.G.: I have the honour to second the motion.

The CHAIRMAN: Before I put the resolution to the meeting, I shall be glad to do my best to answer any questions which any of the proprietors may desire to ask.

(There being no response to the Chairman's invitation to the proprietors to ask questions, the resolution was put to the meeting and carried unanimously.)

RE-ELECTION OF DIRECTORS.

The CHAIRMAN: I now beg to move that Sir Henry Birchenough, Bart., K.C.M.G., Mr. Harold Godfrey Palmer, and Mr. S. H. Le Roy-Lewis, who retire by rotation, be re-elected Directors of the Association.

Mr. GEORGES THEUNIS, G.C.M.G.: I have the honour to second the motion.

(The motion was carried unanimously.)

RE-ELECTION OF AUDITORS.

Mr. J. E. LLOYD: I have pleasure in proposing that the firm of Messrs. George A. Touche & Co., of Basildon House, Moorgate, London, E.C. 2 (Chartered Accountants), be re-appointed Auditors for the ensuing year at a fee of 250 guineas.

Mr. A. C. WHITMEE: I have pleasure in seconding.

(The resolution was carried unanimously.)

The CHAIRMAN: That, My Lords, ladies and gentlemen, concludes our business. I will close the meeting by thanking you cordially for your attendance this afternoon.

VOTE OF THANKS TO CHAIRMAN AND DIRECTORS.

Mr. H. F. CHAMEN: I think we should all like to propose a vote of thanks to the Chairman for the very able way in which he has put the accounts to us to-day, and to the whole of the Board of Directors for the work they have done.

Major A. G. SAUNDERS: I shall be glad to second that.

(The resolution was carried with acclamation.)

The CHAIRMAN: On behalf of my colleagues and myself, I thank you very cordially for the motion which has been put so kindly and for the exceedingly kind manner in which it has been received.

(The meeting then closed.)

South African Lighting Association, Ltd.

ANNUAL GENERAL MEETING

The Forty-Fifth Ordinary General Meeting of the shareholders of the South African Lighting Association, Ltd., was held in the Association's London Offices, 48, Copthall Avenue, E.C. 2, on Wednesday, May 30, 1934—Mr. WILLIAM CASH, J.P., F.C.A. (Chairman of Directors), presiding.

The SECRETARY (Mr. William Cash, Jnr., M.A., F.C.A.) read the notice convening the meeting, together with the minutes of the last Ordinary General Meeting, held on May 31, 1933, which were confirmed and signed; after which the Secretary also read the Auditor's report on the accounts and balance-sheet.

THE CHAIRMAN'S ADDRESS.

The CHAIRMAN, in moving the resolution for the adoption of the report and accounts for the twelve months ended Dec. 31, 1933, said that the report and accounts were in the shareholders' hands, and it was not necessary for him to say much by way of enlargement on the statements contained therein.

The profit and loss account showed a local profit a year ago of £4,979, and they then had to make provision for deferred reading of meters and discount amounting to £904, reducing the profit to £4,075, as against £4,607 in the present accounts. On the other side, Dominion income-tax accounted for £386, as compared with £883 a year ago; so they were better off in this respect by £497. A year ago they had an additional item of profit on exchange of £2,229, against which they had nothing this year. The result was a total decrease in profit of £1,200, which was equal to nearly 1½% dividend. When speaking to the shareholders in 1933 he had said that they hoped to be able to continue the same dividend of 4%; but to that extent they had been disappointed, and this was the reason for it.

They had not done quite so well in respect of residuals, and coal had cost them slightly more. Maintenance and salaries were slightly up. As regards the sales of gas, it was stated in the report that the sales at Port Elizabeth showed an increase for the second half of the year which almost offset decreases in the first half; and at Grahamstown there was an increase over the whole year. The number of consumers showed a small decrease at Port Elizabeth, a certain number of disconnected old meters having been removed. There was some improvement in regard to leakage. At Grahamstown they had had 35 new consumers, while their officials had been able to obtain a gas supply in connection with the local mental hospital, which was now completely equipped with gas apparatus. There had been no change in the price of gas.

THE NEW ENGINEER.

There was a matter to which he would particularly like to refer, and that was the expiration of Mr. Gardner Pennington's Agreement with the Association last year. He had been away from England for five years and had not been very anxious to remain in South Africa, though he consented to stay until the new Manager took over. In his place they had sent out Mr. J. H. Goldsmith, who came from the South Suburban Gas Company with excellent credentials. Before he went out he was

given the opportunity of going round several gas-works, with a view to what would be required in South Africa, particularly as regards the distribution side and the latest types of apparatus. Since he took over, Mr. Goldsmith had initiated a very energetic policy, and though it was yet early days—he only went out in September—he was making distinct endeavours to popularize gas, while he also seemed to be making himself popular in the town. He had organized a series of demonstrations in May and asked for additional gas cookers to be sent out, which seemed to be selling very well. Twenty-five were sold on hire purchase during the month of April.

They had taken over premises for new showrooms in Port Elizabeth, which they thought to be desirable, while they also opened new showrooms in Grahamstown in April. The latter premises were opened by Mrs. Dru Drury, the wife of a doctor related to a gas engineer in this country. At Port Elizabeth the Mayoress had performed the opening ceremony, and had made an excellent speech, such as a trained gas administrator in this country could not have made more useful.

As regards the price of gas, the Directors had had this matter under consideration for a long time, and it was difficult to determine the precise policy that should be adopted. Mr. Goldsmith was anxious that they should reduce the price; they were doing well in regard to industrial consumption and had had a substantial increase in the use of gas for this purpose; but the question was how far any price reduction should be carried in respect of sales for domestic purposes. Those shareholders who read the Technical Press would, perhaps, have noticed the report of the Annual Meeting of the Cape Town and District Gas Light and Coke Company (see "GAS JOURNAL" for May 2, 1934, p. 270), who were in a very similar position to themselves. They had experienced keen competition and had reduced their price very substantially, with the unfortunate result that they were in a worse position and were unable to pay any dividend at all.

They had discussed this question of price very carefully with Mr. Goldsmith before he went out; it was not an easy problem to solve, but the Directors might be trusted to do their best even if it meant that the dividend remained for the time being at the smaller figure at which it stood to-day.

Mr. Goldsmith was anxious to carry out some mains extensions, and they had authorized him to proceed in Walmer and Scotstoun, where he was hopeful of obtaining some additional consumers.

They had dipped into the carry-forward to the extent of £101, and were carrying forward to 1934 the sum of £6,619. In 1932 they increased the carry-forward by £369. so over the two years it was still up.

TRADE CONDITIONS IMPROVING.

There were distinct indications that the trade position was improving. The output from the works was also better in both towns. and there seemed to be opportunities for an increase in the sales of gas. It was unfortunate that the additional charge put on before South Africa went off the Gold Standard still remained; for it seemed to them that this should be revised as the position was now different.

Their renewal fund was up by £350, while their cash reserves were very much the same as a year ago—so they were not hard up for money. He could not look for any immediate or substantial improvement so far as their dividend was concerned, but he hoped that they were approaching the time when they would be rounding the corner.

The CHAIRMAN then formally moved the resolution for the adoption of the report and accounts, which was seconded by Mr. HENRY WOODALL, J.P., M.Inst.C.E., and carried unanimously.

DIVIDEND.

The CHAIRMAN thereafter moved that a dividend be declared at the rate of 3%, less income-tax at 2s. 11½d. in the £, explaining that this curious rate of income-tax was arrived at by agreement with the Inland Revenue Authorities in connection with Dominion income-tax recovered in this country.

Mr. T. N. G. JENNINGS seconded the resolution, which was unanimously agreed to.

RE-ELECTION OF DIRECTOR AND AUDITOR.

The CHAIRMAN next moved the re-election to the Board of Mr. Jesse F. Scott, A.M.Inst.C.E., being the Director retiring by rotation, remarking that Mr. Scott's name was very well known to them. He used to be Consulting Engineer to the Association and was so to-day in addition to being a Director. The Board derived the greatest possible assistance from him. as he was in weekly correspondence with South Africa and scrutinized all the orders. Mr. Scott was invaluable to them.

Mr. F. R. SMITH seconded the resolution, which was unanimously carried, Mr. SCOTT briefly acknowledging.

On the proposition of Mr. W. ARNOTT, seconded by Mr. F. R. SMITH, the retiring Auditor, Mr. Percival D. Griffiths, F.C.A., was re-appointed at the same remuneration as previously—namely, 40 guineas.

VOTES OF THANKS.

The CHAIRMAN expressed the thanks of the Directors and shareholders to the Officers and staff in South Africa and London. They were well served by people who had the interests of the Association at heart. Those in South Africa had an uphill task, especially as electricity was very fashionable out there, and the Municipality cut their prices exceedingly fine. But Mr. Goldsmith and those under him were doing their best to meet this.

Mr. ARNOTT seconded the vote, which was unanimously accorded and duly acknowledged by Mr. WILLIAM CASH, Jnr., who said it would give him great pleasure to pass it on to those in South Africa.

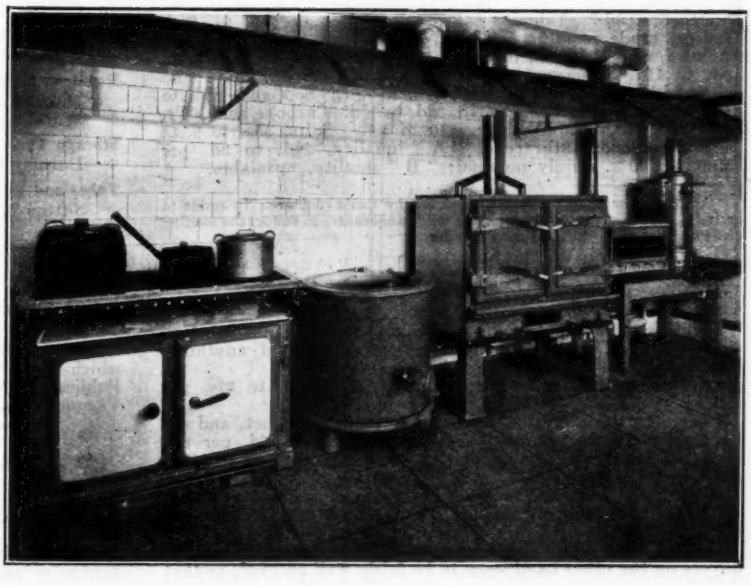
A vote of thanks to the Chairman and Directors was accorded on the proposition of Mr. SMITH, seconded by Mr. ARNOTT, the CHAIRMAN'S acknowledgment of which concluded the business of the meeting.

An Installation by the Preston Gas Company

The last word in modern gas cooking equipment is to be seen in the kitchen of the new County Offices at Preston. The entire installation was carried out by the Preston Gas Company, who are to be congratulated on the way they handled this work. Every facility is to be found in this practical kitchen for the preliminary preparation and cooking of food on a large scale. That gas has been chosen in preference to other methods is but further evidence of the efficiency, economy, and all-round superiority of gas in the kitchen.

The principal pieces of apparatus are by John Wright & Co., Ltd., of Birmingham, and consist of a "Bordo" treble-oven range with solid top hotplate, another smaller "Bordo" cooker, a large "Celt" pudding and vegetable steamer, a "Cito" griller, an "Infanta" vegetable boiler, two "Sector" hot-closets with carving recesses, &c. All this equipment is finished in grey mottled porcelain enamel for easy cleaning. As will be seen from the illustration, a glass canopy surmounts the main apparatus.

Other appliances include a Radiation "Perfectea" boiler, capable of supplying boiling water for 400 cups of tea per hour, and a refrigerator.



GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

There was a plentiful supply of business on the Stock Exchange last week, though varying influences caused activity to switch swiftly from one market to another. At the outset the two important new issues, both of which were largely oversubscribed, led to a set-back in the gilt-edged section, though a revival took place here towards the close. The uncertainties of international affairs also played a part, while Home Rails were depressed by reason of the labour position. On the other hand, an extensive business was done in the better class gold-mining shares and prices again improved, while interest in Rubbers was revived on the optimistic outlook as regards the benefits to be derived from restriction.

Though many other high-class securities suffered by reason of the counter attractions, the number of recorded transactions in Gas stocks and shares was only a trifle less, and prices with few exceptions remained unchanged. The slightly reduced volume of business in this market however, can be partly attributable to the paucity of available supplies, especially in the preference and debenture groups, in which the stocks of the Metropolitan Companies are practically the only ones on offer, though a small parcel of York 4% preference at 98 is attractive. At the time of writing, the list of ordinary stocks available covers a somewhat wider field, including several the returns on which vary from £4s. 2s.% to over 5%. Among these are £3,000 Commercial at 123; £5,000 Gas Light units at 27s. 6d.; £2,028 Newcastle units at 25s. 6d.; and 430 Hongkong and China £1 shares (8% dividend) at 31s. A parcel of 659 £1 shares of the recently-formed South Western Gas Corporation is also offered at a price of 21s. 6d. which should turn out a profitable investment.

Current Sales of Gas Products.

The London Market for Tar Products.

LONDON, *June* 4.

The market for tar products remains firm, with a further advance in the price of creosote. Current values are as follows:

Pitch, 57s. 6d. per ton f.o.b.

Creosote, 3¾d. to 4d. per gallon.

Refined tar, 4d. to 4¼d. per gallon in bulk at makers' works.

Pure toluole, 2s. 6d. to 2s. 7d.; pure benzole, 1s. 9d. to 1s. 10d.; 95/160 solvent naphtha, 1s. 8d. to 1s. 9d.; and 90/160 pyridine, 6s. 6d. to 7s.—all per gallon naked at makers' works.

Tar Products in the Provinces.

June 4.

The average prices of gas-works products during the week were: Gas-works tar, 24s. to 29s. Pitch—East Coast, 55s. to 57s. 6d. f.o.b. West Coast—Manchester Liverpool, Clyde, 55s. to 57s. 6d.* Toluole, naked, North, 2s. 0½d. to 2s. 2½d. Coal-tar crude naphtha, in bulk, North, 6¼d. to 6¾d. Solvent naphtha, naked, North, 1s. 5d. to 1s. 6d. Heavy naphtha, North, 10d. to 11d. Creosote, *ex* works, in bulk, North, liquid and salty, 3d. to 3⅛d.; low gravity, 3⅛d. to 3⅜d.; Scotland, 2⅞d. to 3⅛d. Heavy oils, in bulk, North, 3⅜d. to 4¼d. Carbolic acid, 60's, 2s. to 2s. 1¼d. Naphthalene, £10 to £11. Salts, 55s. to 75s., bags included. Anthracene, "A" quality, 2½d. to 3d. per minimum 40%, purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *June* 2.

Refined tar for road making is leaving the works in substantial quantities, but other products are perhaps, if anything, less active than they have been in recent weeks.

Crude gas-works tar.—The actual value is 35s. to 37s. per ton *ex* works.

Pitch.—Little interest is being taken in this product, and export price remains nominal at about 45s. to 47s. 6d. per ton f.o.b. Glasgow. The home market is also uninteresting with price round 42s. 6d. to 45s. per ton *ex* works.

Refined tar for specification.—The value of this material has settled at round 3⅜d. to 3½d. per gallon *ex* works naked, according to quantity.

Creosote oil.—While prompt supplies are still rather scarce, buyers on the other hand seem to be fairly well covered, so that no change in values can be recorded. B.E.S.A. specification oil is 4d. to 4¼d. per gallon; low gravity, 4⅛d. to 4¾d. per gallon; and neutral oil, 4¼d. to 4⅜d. per gallon—all f.o.r. in bulk.

Cresylic acid.—This product is reasonably active and prices continue steady. Pale, 97/99%, is 1s. 2½d. to 1s. 3½d. per gallon; dark, 97/99%, 1s. to 1s. 1d. per gallon; and pale, 99/100%, 1s. 4d. to 1s. 5d. per gallon—all f.o.r. in buyers' packages.

Crude naphtha is still valued at 4⅜d. to 5¼d. per gallon, according to quality and quantity.

Solvent naphtha.—90/160 grade is 1s. 4d. to 1s. 4½d. per gallon, and 90/190 grade is 8d. to 8¼d. per gallon.

Motor benzole is only available in small quantities at 1s. 6d. to 1s. 7d. per gallon.

Pyridines.—90/160 grade is 5s. to 5s. 3d. per gallon, and 90/140 grade 5s. 6d. to 6s. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole	0	9	to	0	9¼	per gallon at works
Motor "	1	4	"	1	4⅜	" " "
90% "	1	4½	"	1	5	" " "
Pure "	1	7½	"	1	8	" " "

New Capital Issues.

Gosport District Gas Company.—As will be seen from our advertisement columns, Messrs. Llewellyn Puttock & Blake are selling by auction on Thursday, June 21, at 6.30 p.m. in the Gosport Estate Sale Rooms, £15,000 of stock in the Gosport District Gas Company.

Contracts Advertised To-Day.

Coal.
Atherton Urban District Council. [p. 668.]
Malvern Urban District Council. [p. 668.]
Sidmouth Gas Department. [p. 668.]
Sutton-in-Ashfield Gas Committee. [p. 666.]

Condensers, Retubing.
Stafford Gas Department. [p. 668.]

Lamp Controllers.
Wortley Rural District Council. [p. 668.]

Mantles.
Sutton-in-Ashfield Urban District Council. [p. 666.]

Oil (Lubricating).
Sutton-in-Ashfield Urban District Council. [p. 666.]

Pipes.
Carlisle Gas Department. [p. 668.]

Purifying Material—New and Spent.
Carlisle Gas Department. [p. 668.]

Reinforced Concrete Work.
Carlisle Gas Department. [p. 668.]

Repairs—Purifiers and Gasholder.
Malvern Gas Department. [p. 668.]
Workington Gas Department. [p. 668.]

Storage Tank.
Burnley Gas Department. [p. 668.]

Tubes and Fittings.
Sutton-in-Ashfield Urban District Council. [p. 666.]

Trade Notes.

Daniel Adamson & Co., Ltd.

The two latest publications of Messrs. Daniel Adamson & Co., Ltd., Dukinfield, give particulars of two new specialities, which they have now added to their range of manufacture. Publication No. T.233 deals with Rotary Air Compressors and Vacuum Pumps, and No. T.234 with Small Steam Turbines.

Gas Acts (1920 and 1929) Orders.

Mablethorpe and Sutton Gas Company.

The Company are to apply to the Board of Trade for an Order to authorize them to raise £20,000 additional capital by the creation and issue of ordinary or preference shares, and to borrow an amount not exceeding 75% of such further capital.

STOCK AND SHARE LIST.

Official Quotations on the London and Provincial Stock Exchanges.

Issue. £	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations June 1	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week.
1,551,868	Stk.	Apl. 9	7	7	Alliance & Dublin Ord. ...	128–138	...	138–135
374,000	"	Jan. 8	4	4	Do. 4 p c. Deb. ...	90–100	...	...
557,655	"	Mar. 5	7	7	Barnet Ord. 7 p.c.	167–172	...	171½
300,000	1	May 7	1/4⅛	1/9⅛	Bombay, Ltd.	26/6–28/6	...	27/ –28/-
178,480	Stk.	Feb. 19	9½	9½	Bournemouth sliding scale	203–208	...	...
550,050	"	"	7	7	Do. 7 p.c. max. ...	165–170	...	...
439,160	"	"	6	6	Do. 6 p.c. Pref. ...	142–147	...	145–146½
50,000	"	Dec. 18	3	3	Do. 3 p.c. Deb. ...	79–84	...	...
262,025	"	"	4	4	Do. 4 p.c. Deb. ...	105–110	...	...
335,000	"	"	5	5	Do. 5 p.c Deb. ...	121–126	...	...
357,900	"	Mar. 5	7½	7½	Brighton, &c., 6 p.c. Con. ...	161–166	...	164–165
540,000	"	"	6⅔	6⅔	Do. 5 p.c. Con. ...	151–156	...	156
195,500	"	"	6	6	Do. 6 p.c. B. Pref.	140–145	...	...
1,487,500	"	Mar. 5	5	5	Bristol 5 p.c. max.	116–117*a*	...	...
120,420	"	Dec. 18	4	4	Do. 1st 4 p.c. Deb. ...	104–106*a*	...	...
217,870	"	"	4	4	Do. 2nd 4 p.c. Deb. ...	104–106*a*	...	...
328,790	"	"	5	5	Do. 5 p.c. Deb.	123–125*a*	...	...
885,000	"	Apl. 9	7	8	British Ord.	155–160	+2	155½–160
100,000	"	Dec. 18	7	7	Do. 7 p c. Pref.	158–158	...	...
350,000	"	"	5½	6½	Do. 5½ p.c. Pref.	106–111	...	...
120,000	"	"	4	4	Do. 4 p.c. Red. Deb. ...	97–102	...	...
450,000	"	"	5	5	Do. 5 p.c. Red. Deb. ...	109–114	...	...
160,000	"	Jan. 8	5	5	Cambridge 5 p.c. Deb. ...	115–120	...	...
100,000	10	22 May '33	6	4	Cape Town, Ltd.	1½–3½	...	...
100,000	10	Nov. 6	4½	4½	Do. 4½ p.c. Pref. ...	5 –7	...	...
150,000	Stk.	Dec. 18	4½	4½	Do. 4½ p.c. Deb. ...	95–100	...	...
626,850	"	Feb. 19	6	6	Cardiff Con. Ord.	128–133	...	...
237,860	"	Jan. 8	5	5	Do. 5 p.c. Red. Deb.	103–108	...	...
157,150	"	Feb. 19	5	6⅔	Chester 5 p.c. Ord.	112½–122½*b*	...	...
98,936	1	May 7	2/-	2/-	Colombo, Ltd. Ord.	1⅞–1⅞	...	...
24,500	1	"	1/4⅛	1/4⅛	Do. 7 p.c. Pref. ...	18/6 –20/6	...	...
609,204	1	Mar. 19	/11'48	/11'48	Colonial Gas Assn. Ltd. Ord.	1–1⅛	...	...
296,053	1	"	1/8'80	1/8'80	Do. 8 p.c. Pref.	23/6–25/6	...	...
1,775,005	Stk.	Feb. 19	5	6⅔	Commercial Ord.	120–126	...	120–121½
475,000	"	Dec. 18	3	3	Do. 3 p.c. Deb. ...	77–82	...	81–81½
286,344	"	Mar. 5	5	5	Do. 5 p.c. Deb. ...	120–125	...	...
807,560	"	Feb. 19	7	7	Croydon sliding scale ...	154–159	...	156⅔–158
569,590	"	"	5	5	Do. max. div.	105–110	...	108¾–109½
620,385	"	Jan. 8	5	5	Do. 5 p.c. Deb.... ...	121–126	...	...
542,270	"	Mar. 5	7	10	Derby Con.	175–180*c*	...	...
55,000	"	Jan. 8	4	4	Do. 4 p.c. Deb.	98–100*c*	...	...
209,000	"	Feb 19	5	5	East Hull Ord. 5 p.c. ...	106–111	...	...
181,625	"	Mar. 5	6	6	East Surrey Ord. 5 p.c. ...	126–131	...	...
175,609	"	Dec. 18	5	5	Do. 5 p.c. Deb. ...	118–123	...	...
1,002,180	"	Apl. 9	†5	†7	European, Ltd.	122 126	–½	122½–124
19,343,763	"	Feb. 19	5⅜	5⅜	Gas Light & Coke 4 p.c. Ord.	26/10½ 27/4½*f*	...	27/–27/4½
2,600,000	"	"	3⅜	3⅜	Do. 3⅜ p.c. max. ...	87 90	...	87½–88½
4,477,106	"	"	4	4	Do. 4 p.c. Con. Pref. ...	103–106	...	104–105½
6,103,497	"	May 28	3	3	Do. 3 p.c. Con. Deb. ...	84–87*	–1	84½–85½
9,643,770	"	"	5	5	Do. 5 p.c. Red. Deb. ...	115–118*	–1	117
8,500,000	"	"	4⅛	4⅛	Do. 4⅛ p.c. Red. Deb. ...	113–116*	–1	114–114⅜
270,466	"	Mar. 5	6	6	Harrogate New Cons. ...	125–130	...	...
82,500	"	Mar. 5	7	7	Hastings & St. L. 5 p.c. Conv.	147–152	...	152
258,740	"	"	5⅛	5⅛	Do. 3½ p.c. Conv	115 –120	...	120
140,000	1	Apl. 23	1/7⅛	1/7⅛	Hongkong & China, Ltd. ...	1⅛–1⅛	...	...
213,200	Stk.	Mar. 5	6	6	Hornsey Con. 3½ p.c. ...	128 –133	...	...
5,600,000	"	May 28	10	14	Imperial Continental Cap.	209–214*	–5	209½–212
223,130	"	Feb. 5	3½	3½	Do. 3½ p.c. Red Deb.	89–94	...	...
235,342	"	Mar. 5	8⅛	8⅛	Lea Bridge 5 p.c. Ord. ...	169–174	...	...
2,167,410	"	Mar. 5	6	6	Liverpool 5 p.c. Ord. ...	130–132*b*	...	...
245,500	"	Dec. 18	5	5	Do 5 p.c. Red. Pref. ...	101–111*b*	...	...
306,083	"	July 17	4	4	Do. 4 p.c. Deb. ...	101½–103½*b*	...	...
165,736	"	Feb. 19	8	10	Maidstone 5 p.c. Cap. ...	180 –190	...	...
56,176	"	Jan. 8	3	3	Do. 3 p.c. Deb. ...	72–77	...	...
75,000	5	May 28	†10	†10	Malta & Mediterranean ...	9 –11*	...	...
392,000	—	Apl. 3	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	98–103	...	103
281,978	Stk.	Feb. 19	5	5	M. S. Utility "C." Cons. ...	113–118	...	...
818,657	"	"	4	4	Do. 4 p.c. Cons. Pref.	95–100	...	...
360,075	"	Jan. 8	4	4	Do. 4 p.c. Deb. ...	100–105	...	...
148,955	"	"	5	†5	Do. 5 p.c. Deb. ...	117–122	...	...
675,000	"	May 28	†8	6	Montevideo, Ltd.	60–65*	–3	...
2,061,315	"	Mar. 5	5	5⅔	Newcastle & Gateshead Con.	25/–25/6*d*	...	...
682,856	"	"	4	4	Do. 4 p.c. Pref. ...	99–101*d*	...	...
776,706	"	Jan. 8	3½	3½	Do. 3½ p.c. Deb. ...	92–93*d*	...	...
277,285	"	May 7	5	5	Do. 5 p.c. Deb. '48 ...	105–107*d*	...	...
274,000	"	Feb. 19	5	5	Newport (Mon.) 5 p.c. max.	106–10*c*a	...	...
204,940	"	Mar. 19	7½	7½	North Middlesex 6 p c. Con.	155–160	...	...
393,160	"	Feb. 5	5	5	Northampton 5 p.c. max. ...	100 –105	+1	100
300,000	"	May 7	†9	†7	Oriental, Ltd.	155–160	...	...
316,617	"	Dec. 18	8	8	Plym'th & Stonehouse 5 p.c.	167–172	...	172
504,416	"	Feb. 19	8	8	Portsm'th Con Stk. 4 p c. Std	168 –173	...	171–173½
241,446	"	"	5	5	Do. 5 p.c. max. ...	105–110	...	107–108½
114,000	"	Feb. 19	5	5	Preston 5 p.c. Pref.	103–108	...	...
686,312	"	Jan. 22	4	4	Primitiva 4 p.c. Rd. Db. 1911	87–92	...	...
389,313	"	Dec. 18	4	4	Do. 4 p.c. Cons. Deb.	98–93	...	...
150,000	10	Mar. 19	6	6	San Paulo 6 p.c. Pref. ...	7–8	...	7⅞
1,786,968	Stk.	Mar. 19	6	6	Sheffield Cons.	137–139*e*	...	...
95,000	"	Jan. 8	4	4	Do. 4 p.c. Deb.	98 –102*e*	+2	...
133,201	"	Feb. 19	8½	5	Shrewsbury 5 p.c. Ord. ...	135–140	...	139–139½
90,000	10	May 28	†4	†3	South African	2–4*	–½	...
6,709,895	Stk.	Feb. 19	5	7	South Met. Ord.	131–134	...	132½–134
1,135,812	"	"	6	6	Do. 6 p c. Irred. Pf.	140 –145	...	143–145
850,000	"	"	4	4	Do. 4 p.c. Irred. Pf.	103–107	...	105 –105½
1,895,445	"	Jan. 8	3	3	Do. 3 p.c. Deb ...	84–87	...	...
1 000,000	"	Jan. 22	5	5	Do. 5 p.c. Red. Deb.	114–117	...	...
209,820	"	Mar. 5	8⅛	8⅛	South Shields Con.	165–167*d*	– ½	...
1,543,795	"	Feb. 19	6	6	South Suburban Ord 5 p.c.	130–133	...	130½
512,825	"	"	5	5	Do. 5 p.c. Pref.	118–123	...	...
300,000	"	"	—	4	Do. 4 p.c. Pref.	103–108	...	...
868,837	"	Dec. 18	5	5	Do. 5 p.c. Deb.	121–126	...	...
100,000	"	"	4	4	Do. 4 p c. Deb.	103–108	...	105½
647,740	"	Mar. 5	5	5	Southampt'n Ord. 5 p.c. max.	109 –114	...	112–113½
121,275	"	Dec. 18	4	4	Do. 4 p.c. Deb.	100–105	...	...
350,000	"	Mar. 5	5½	5½	Swansea 5½ p.c. Red. Pref.	106 111	...	...
200,000	"	Dec. 18	6⅔	6⅔	Do. 6⅔ p c. Red. Deb.	103 108	...	...
1,076,490	"	Mar 5	6⅔	6⅔	Tottenham and District Ord.	148 –153	...	152½–153½
409,835	"	"	5⅔	5⅔	Do. 5⅔ p.c. Pref. ...	126 –131	...	...
62,235	"	"	5	5	Do. 5 p.c. Pref. ...	112 –117	...	...
199,005	"	Dec. 18	4	4	Do. 4 p.c. Deb. ...	97–102	...	...
85,701	"	Apl. 9	6	6	Tuscan, Ltd. 6 p c. Red. Db.	90–100	...	...
349,110	"	Mar. 5	7	7	Uxbridge, &c., 5 p.c. ...	150 –155	...	...
88,390	"	"	5	5	Do. 5 p.c. Pref ...	112 –117	...	...
1,322,220	"	Mar. 5	7	7	Wandsworth Consolidated	156–161	...	159–161
1,096,378	"	"	5	5	Do. 5 p.c. Pref.	119 –124	...	123½ –124
1,317,964	"	Dec. 18	5	5	Do. 5 p.c. Deb.	122 –127	...	...
158,400	"	Mar. 5	5	6*g*	Winchester W.& G.5 p.c. Con.	115–120	...	...

Quotations at:—*a.*—Bristol. *b.*—Liverpool *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of stock. *g.*—Paid £3, including 10s. on account of back dividends. * Ex. div. † Paid free of income-tax. ‡ For year.

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Electrical Distribution of Yorkshire, Ltd.
Calcutta Electric Supply Corporation, Ltd.
Scottish Power Co., Ltd.
Lancashire Electric Light & Power Co., Ltd.
British Columbia Power Corporation Ltd.
Imperial Continental Gas Association.
South Metropolitan Gas Co.
Consolidated Gas, Electric Light & Power Co. of Baltimore.
Midland Counties Electric Supply Co., Ltd.
Metropolitan Electric Supply Co., Ltd.

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15, Moorgate, London, E.C.2.

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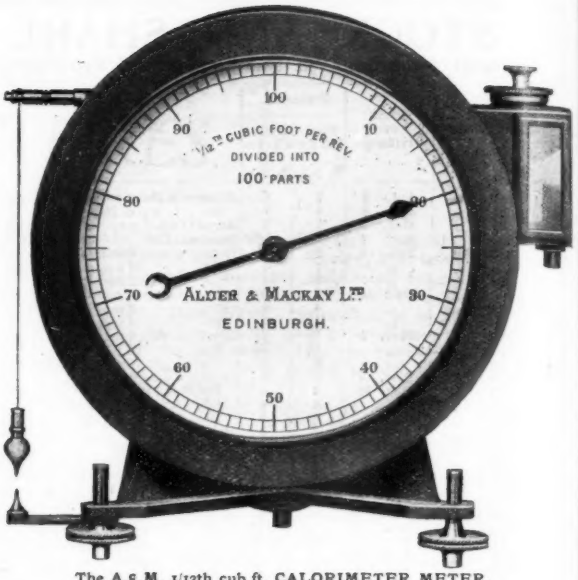
See other Stock Announcement on p. 665

The 'Sergeant' shows some Specialities



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